

OM-4417 210 403A

September 2004

## Processes



Stick (SMAW) Welding

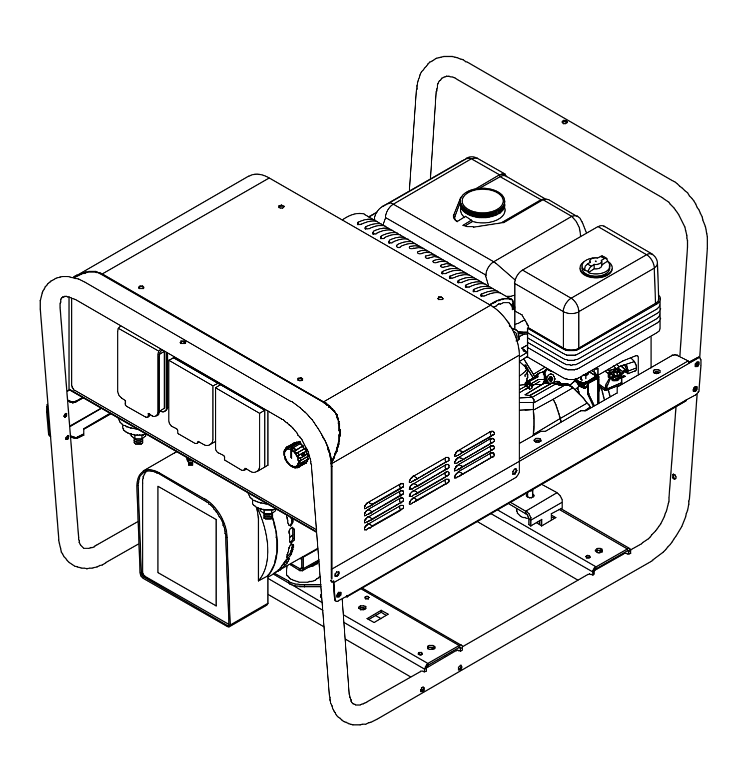
## Description





Engine Driven Welding Generator

# Blue Star® 145
# Blue Star® 145 DX



# OWNER'S MANUAL



Visit our website at

**www.MillerWelds.com**

# From Miller to You

*Thank you* and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.




Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001:2000 Quality System Standard.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**




Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.



# TABLE OF CONTENTS

# SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

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▲ **Warning: Protect yourself and others from injury — read and follow these precautions.**

## 1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

## 1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-7. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**



### ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground — check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring — replace cord immediately if damaged — bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

**SIGNIFICANT DC VOLTAGE exists in inverters after stopping engine.**

- Stop engine on inverter and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



### FUMES AND GASES can be hazardous.

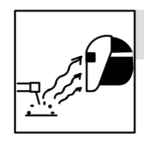
Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



### BUILDUP OF GAS can injure or kill.

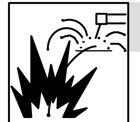
- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



### ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

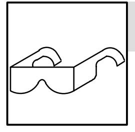
- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.



### WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



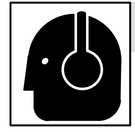
### FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



### HOT PARTS can cause severe burns.

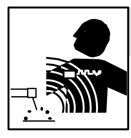
- Allow cooling period before maintaining.
- Wear protective gloves and clothing when working on a hot engine.
- Do not touch hot engine parts or just-welded parts bare-handed.



### NOISE can damage hearing.

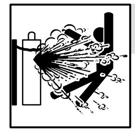
Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



### MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.

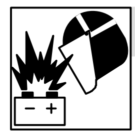


### CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

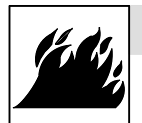
- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder — explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

## 1-3. Engine Hazards



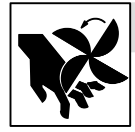
### BATTERY EXPLOSION can BLIND.

- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables or servicing battery.
- Do not allow tools to cause sparks when working on a battery.
- Do not use welder to charge batteries or jump start vehicles.
- Observe correct polarity (+ and −) on batteries.
- Disconnect negative (−) cable first and connect it last.



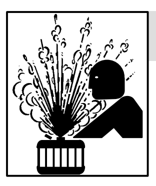
### FUEL can cause fire or explosion.

- Stop engine and let it cool off before checking or adding fuel.
- Do not add fuel while smoking or if unit is near any sparks or open flames.
- Do not overfill tank — allow room for fuel to expand.
- Do not spill fuel. If fuel is spilled, clean up before starting engine.
- Dispose of rags in a fireproof container.
- Always keep nozzle in contact with tank when fueling.



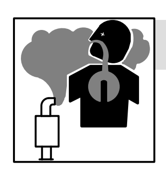
### MOVING PARTS can cause injury.

- Keep away from fans, belts, and rotors.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Stop engine before installing or connecting unit.
- Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
- To prevent accidental starting during servicing, disconnect negative (−) battery cable from battery.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall panels or guards and close doors when servicing is finished and before starting engine.
- Before working on generator, remove spark plugs or injectors to keep engine from kicking back or starting.
- Block flywheel so that it will not turn while working on generator components.



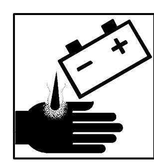
### STEAM AND HOT COOLANT can burn.

- If possible, check coolant level when engine is cold to avoid scalding.
- Always check coolant level at overflow tank, if present on unit, instead of radiator (unless told otherwise in maintenance section or engine manual).
- If the engine is warm, checking is needed, and there is no overflow tank, follow the next two statements.
- Wear safety glasses and gloves and put a rag over radiator cap.
- Turn cap slightly and let pressure escape slowly before completely removing cap.



### ENGINE EXHAUST GASES can kill.

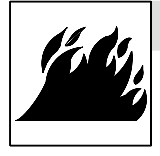
- Use equipment outside in open, well-ventilated areas.
- If used in a closed area, vent engine exhaust outside and away from any building air intakes.





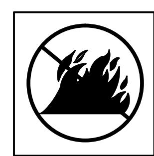
### BATTERY ACID can BURN SKIN and EYES.

- Do not tip battery.
- Replace damaged battery.
- Flush eyes and skin immediately with water.



### ENGINE HEAT can cause fire.

- Do not locate unit on, over, or near combustible surfaces or flammables.
- Keep exhaust and exhaust pipes way from flammables.



### EXHAUST SPARKS can cause fire.

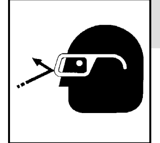
- Do not let engine exhaust sparks cause fire.
- Use approved engine exhaust spark arrestor in required areas — see applicable codes.

## 1-4. Compressed Air Hazards



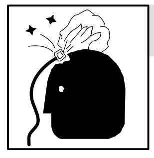
### BREATHING COMPRESSED AIR can cause serious injury or death.

- Do not use compressed air for breathing.
- Use only for cutting, gouging, and tools.



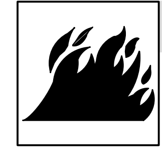
### COMPRESSED AIR can cause injury.

- Wear approved safety goggles.
- Do not direct air stream toward self or others.



### TRAPPED AIR PRESSURE AND WHIPPING HOSES can cause injury.

- Release air pressure from tools and system before servicing, adding or changing attachments, or opening compressor oil drain or oil fill cap.



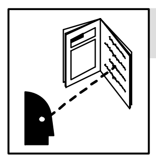
### HOT METAL from air arc cutting and gouging can cause fire or explosion.

- Do not cut or gouge near flammables.
- Watch for fire; keep extinguisher nearby.



### HOT PARTS can cause burns and injury.

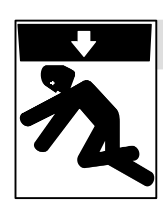
- Do not touch hot compressor or air system parts.
- Let system cool down before touching or servicing.



### READ INSTRUCTIONS.

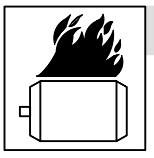
- Read Owner's Manual before using or servicing unit.
- Stop engine and release air pressure before servicing.

## 1-5. Additional Symbols For Installation, Operation, And Maintenance



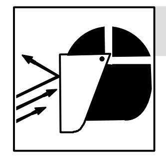
### FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, trailer, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



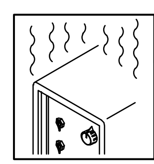
### OVERHEATING can damage motors.

- Turn off or unplug equipment before starting or stopping engine.
- Do not let low voltage and frequency caused by low engine speed damage electric motors.
- Do not connect 50 or 60 Hertz motors to the 100 Hertz receptacle where applicable.



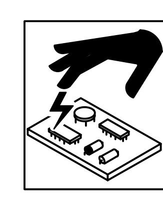
### FLYING SPARKS can cause injury.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



### OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



### STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

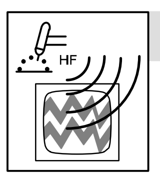


### TILTING OF TRAILER can cause injury.

- Use tongue jack or blocks to support weight.
- Properly install welding generator onto trailer according to instructions supplied with trailer.

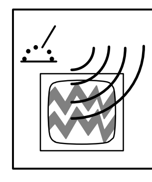
### READ INSTRUCTIONS.

- Use only genuine MILLER/Hobart replacement parts.
- Perform engine and air compressor (if applicable) maintenance and service according to this manual and the engine/air compressor (if applicable) manuals.




### H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



### ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as microprocessors, computers, and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

## 1-6. California Proposition 65 Warnings

▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

**For Gasoline Engines:**

▲ **Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

**For Diesel Engines:**

▲ **Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

## 1-7. Principal Safety Standards

*Safety in Welding, Cutting, and Allied Processes,* ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126 (phone: 305-443-9353, website: www.aws.org).

*Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping,* American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126 (phone: 305-443-9353, website: www.aws.org).

*National Electrical Code,* NFPA Standard 70, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org and www. sparky.org).

*Safe Handling of Compressed Gases in Cylinders,* CGA Pamphlet P-1, from Compressed Gas Association, 1735 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102 (phone: 703-412-0900, website: www.cganet.com).

*Code for Safety in Welding and Cutting,* CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3 (phone: 800-463-6727 or in Toronto 416-747-4044, website: www.csa-international.org).

*Practice For Occupational And Educational Eye And Face Protection,* ANSI Standard Z87.1, from American National Standards Institute, 11 West 42nd Street, New York, NY 10036–8002 (phone: 212-642-4900, website: www.ansi.org).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work,* NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org and www. sparky.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (there are 10 Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

## 1-8. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

**About Pacemakers:**

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

# SECTION 2 − CONSIGNES DE SÉCURITÉ − LIRE AVANT UTILISATION

rom_fre 8/03

## ▲ Avertissement: Protégez vous et les autres des blessures − lisez et suivez ces précautions.

## 2-1. Signification des symboles



Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ **Identifie un message de sécurité particulier.**

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*

Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

## 2-2. Dangers relatifs au soudage à l'arc

▲ **Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 2-6 . Veuillez lire et respecter toutes ces normes de sécurité.**

▲ **L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

▲ **Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**



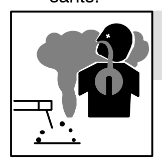
### UN CHOC ÉLECTRIQUE peut tuer.

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Des précautions de sécurité supplémentaires sont requises dans des environnements à risque comme: les endroits humides ou lorsque l'on porte des vêtements mouillés; sur des structures métalliques au sol, grillages et échafaudages; dans des positions assises, à genoux et allongées; ou quand il y a un risque important de contact accidentel avec la pièce ou le sol. Dans ces cas utiliser les appareils suivants dans l'ordre de préférence: 1) un poste à souder DC semi−automatique de type CV (MIG/MAG), 2) un poste à souder manuel (électrode enrobée) DC, 3) un poste à souder manuel AC avec tension à vide réduite. Dans la plupart des cas, un poste courant continu de type CV est recommandé. Et, ne pas travailler seul!
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation − Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé − remplacer le cordon immédiatement s'il est endommagé − un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct − ne pas utiliser le connecteur de pièce ou le câble de retour.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

**Une tension DC importante subsiste à l'intérieur des onduleurs après avoir coupé l'alimentation.**

- Couper l'alimentation du poste et décharger les condensateurs d'entrée comme indiqué dans la Section Maintenance avant de toucher des composants.



### LES FUMÉES ET LES GAZ peuvent être dangereux.

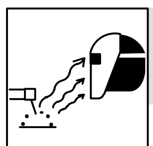
Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'interieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et si nécessaire, en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.



### LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



### LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

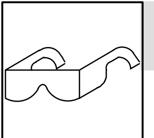
- Porter un casque de soudage muni d'un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l'éclair et de l'éblouissement; demander aux autres personnes de ne pas regarder l'arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (laine ou cuir) et une protection des pieds.



### LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.
- Suivre les recommandations dans OSHA 1910.252(a)(2)(iv) et NFPA 51B pour les travaux à chaud et avoir de la surveillance et un extincteur à proximité.



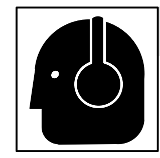
### DES PARTICULES VOLANTES peuvent blesser les yeux.

- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.



### DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

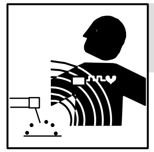
- Prévoir une période de refroidissement avant d'effectuer des travaux d'entretien.
- Porter des gants et des vêtements de protection pour travailler sur un moteur chaud.
- Ne pas toucher à mains nues les parties chaudes du moteur ni les pièces récemment soudées.



### LE BRUIT peut affecter l'ouïe.

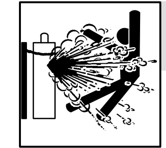
Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.



### LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.



### Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

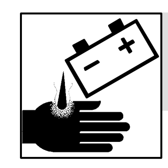
- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée − risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publication P-1 CGA énumérées dans les normes de sécurité.

## 2-3. Dangers existant en relation avec le moteur



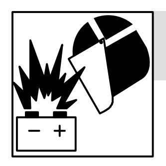
### LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



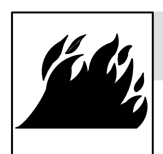

### L'ACIDE DE LA BATTERIE peut provoquer des brûlures dans les YEUX et sur la PEAU.

- Ne pas renverser la batterie.
- Remplacer une batterie endommagée.
- Rincer immédiatement les yeux et la peau à l'eau.



### L'EXPLOSION DE LA BATTERIE peut RENDRE AVEUGLE.

- Toujours porter une protection faciale, des gants en caoutchouc et vêtements de protection lors d'une intervention sur la batterie.
- Arrêter le moteur avant de débrancher ou de brancher les câbles de batterie.
- Eviter de provoquer des étincelles avec les outils en travaillant sur la batterie.
- Ne pas utiliser le poste de soudage pour charger les batteries ou des véhicules de démarrage rapide.
- Observer la polarité correcte (+ et −) sur les batteries.
- Débrancher le câble négatif (−) en premier lieu. Le rebrancher en dernier lieu.



### LE CARBURANT MOTEUR peut provoquer un incendie ou une explosion.

- Arrêter le moteur avant de vérifier le niveau de carburant ou de faire le plein.
- Ne pas faire le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
- Ne pas faire le plein de carburant à ras bord; prévoir de l'espace pour son expansion.
- Faire attention de ne pas renverser de carburant. Nettoyer tout carburant renversé avant de faire démarrer le moteur.
- Jeter les chiffons dans un récipient ignifuge.



### DES ORGANES MOBILES peuvent provoquer des blessures.

- Ne pas approcher les mains des ventilateurs, courroies et autres pièces en mouvement.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.
- Arrêter le moteur avant d'installer ou brancher l'appareil.
- Demander seulement à un personnel qualifié d'enlever les dispositifs de sécurité ou les recouvrements pour effectuer, s'il y a lieu, des travaux d'entretien et de dépannage.
- Pour empêcher tout démarrage accidentel pendant les travaux d'entretien, débrancher le câble négatif (−) de batterie de la borne.
- Ne pas approcher les mains, cheveux, vêtements lâches et outils des organes mobiles.
- Remettre en place les panneaux ou les dipositifs de protection et fermer les portes à la fin des travaux d'entretien et avant de faire démarrer le moteur.
- Avant d'intervenir, déposer les bougies ou injecteurs pour éviter la mise en route accidentelle du moteur.
- Bloquer le volant moteur pour éviter sa rotation lors d'une intervention sur le générateur.



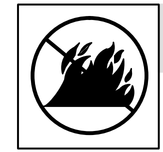
### LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT CHAUD peuvent provoquer des brûlures.

- Il est préférable de vérifier le liquide de refroidissement une fois le moteur refroidi pour éviter de se brûler.
- Toujours vérifier le niveau de liquide de refroidissement dans le vase d'expansion (si présent), et non dans le radiateur (sauf si précisé autrement dans la section maintenance du manuel du moteur).
- Si le moteur est chaud et que le liquide doit être vérifié, opérer comme suivant :
- Mettre des lunettes de sécurité et des gants, placer un torchon sur le bouchon du radiateur.
- Dévisser le bouchon légèrement et laisser la vapeur s'échapper avant d'enlever le bouchon.



### LA CHALEUR DU MOTEUR peut provoquer un incendie.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Tenir à distance les produits inflammables de l'échappement.



### LES ÉTINCELLES À L'ÉCHAPPEMENT peuvent provoquer un incendie.

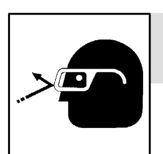
- Empêcher les étincelles d'échappement du moteur de provoquer un incendie.
- Utiliser uniquement un pare-étincelles approuvé − voir codes en vigueur.

## 2-4. Dangers liés à l'air comprimé



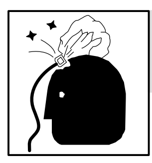
### RESPIRER L'AIR COMPRIMÉ peut provoquer des blessures graves ou causer la mort.

- Ne pas utiliser l'air comprimé pour respirer.
- Utiliser l'air comprimé seulement pour le coupage, gougeage et les outils pneumatiques.



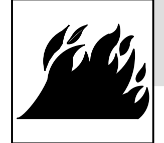
### L'AIR COMPRIMÉ peut provoquer des blessures.

- Porter des lunettes de sécurité approuvées.
- Ne pas diriger le jet d'air vers d'autres ou soi−même.



### L'AIR COMPRIME EMMAGASINE ET DES TUYAUX SOUS PRESSION peuvent provoquer des blessures.

- Relâcher la pression d'air de l'outillage ou du système avant d'effectuer la maintenance, avant de changer ou de rajouter des éléments ou avant d'ouvrir la purge ou le bouchon de remplissage d'huile.



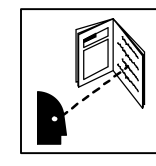
### Le METAL CHAUD lors du coupage et gougeage plasma peut provoquer un incendie ou une explosion.

- Ne pas couper ou gouger à proximité de produits inflammables.
- Surveillez et garder un extincteur à proximité.



### DES PIECES CHAUDES peuvent provoquer des brûlures et blessures.

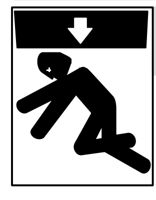
- Ne pas toucher le compresseur ou d'autres éléments du circuit air comprimé chauds.
- Laisser l'ensemble se refroidir avant de toucher ou d'effectuer la maintenance.



### LIRE LES INSTRUCTIONS.

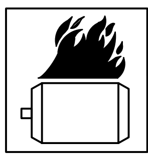
- Lisez le manuel d'instructions avant l'utilisation ou la maintenance de l'appareil.
- Arrêter le moteur et relâcher la pression avant d'effectuer la maintenance.

## 2-5. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance



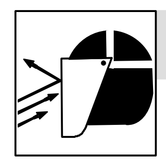
### LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil lui-même ; sans chariot, de bouteilles de gaz, remorque, ou autres accessoires.
- Utiliser un équipement de levage de capacité suffisante pour lever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.



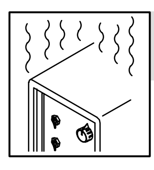
### LE SURCHAUFFEMENT peut endommager le moteur électrique.

- Arrêter ou déconnecter l'équipement avant de démarrer ou d'arrêter le moteur.
- Ne pas laisser tourner le moteur trop lentement sous risque d'endommager le moteur électrique à cause d'une tension et d'une fréquence trop faibles.
- Ne pas brancher de moteur de 50 ou de 60 Hz à la prise de 100 Hz, s'il y a lieu.



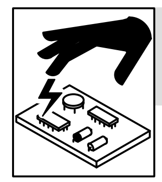
### LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Affuterr l'électrode au tungstène uniquement à la meuleuse dotée de protecteurs. Cette manoeuvre est à exécuter dans un endroit sûr lorsque l'on porte l'équipement homologué de protection du visage, des mains et du corps.
- Les étincelles risquent de causer un incendie − éloigner toute substance inflammable.



### L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Laisser l'équipement refroidir ; respecter le facteur de marche nominal.
- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d'air du poste.



### LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimes.

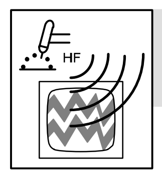


### UNE REMORQUE QUI BASCULE peut entraîner des blessures.

- Utiliser les supports de la remorque ou des blocs pour soutenir le poids.
- Installer convenablement le poste sur la remorque comme indiqué dans le manuel s'y rapportant.

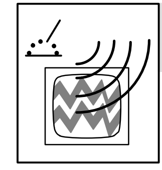
### LIRE LES INSTRUCTIONS.

- Utiliser seulement les pièces de rechange d'origine.
- Effectuer la maintenance du moteur et du compresseur (si applicable) suivant ce manuel et le manuel du moteur/compresseur (si applicable).




### LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute fréquence (H.F.) peut provoquer des interférences avec les équipements de radio−navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et un blindage pour réduire les interférences éventuelles.



### LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

## 2-6. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, norme ANSI Z49.1, de l'American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126 (téléphone : (305) 443−9353, site Web : www.aws.org).
Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping, norme American Welding Society AWS F4.1, de l'American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126 (téléphone : (305) 443−9353, site Web : www.aws.org).
National Electrical Code, norme NFPA 70, de la National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269−9101 (téléphone : (617) 770−3000, sites Web : www.nfpa.org et www.sparky.org).
Safe Handling of Compressed Gases in Cylinders, brochure CGA P−1, de la Compressed Gas Association, 1735 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202−4102 (téléphone : (703) 412−0900, site Web : www.cganet.com).
Code for Safety in Welding and Cutting, norme CSA W117.2, de la Canadian Standards Association, Standards Sales, 178 boulevard Rexdale, Rexdale (Ontario) Canada M9W 1R3 (téléphone : (800) 463−6727 ou à Toronto : (416) 747−4044, site Web : www.csa−international.org).
Practice For Occupational And Educational Eye And Face Protection, norme ANSI Z87.1, de l'American National Standards Institute, 11 West 42nd Street, New York, NY 10036−8002 (téléphone : (212) 642−4900, site Web : www.ansi.org).
Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, norme NFPA 51B, de la National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269−9101 (téléphone : (617) 770−3000, site Web : www.nfpa.org et www.sparky.org).
OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, de l'U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (il y a 10 bureaux régionaux − Téléphone pour la Région 5, Chicago : (312) 353−2220, site Web : www.osha.gov).

## 2-7. Information sur les champs électromagnétiques

Données sur le soudage électrique et les effets des champs magnétiques basse fréquence sur l'organisme
En parcourant les câbles de soudage, le courant crée des champs électromagnétiques. Les effets potentiels de tels champs restent préoccupants. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité de spécialistes du National Research Council a conclu : « L'accumulation de preuves n'a pas démontré que l'exposition aux champs magnétiques et aux champs électriques à haute fréquence constitue un risque pour la santé humaine ». Toutefois, les études et l'examen des preuves se poursuivent. En attendant les conclusions finales de la recherche, il serait souhaitable de réduire l'exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques en milieu de travail, respecter les consignes suivantes :
1. Garder les câbles ensemble en les torsadant ou en les fixant avec du ruban adhésif.
2. Mettre tous les câbles du côté opposé à l'opérateur.
3. Ne pas s'enrouler les câbles autour du corps.
4. Garder le poste de soudage et les câbles le plus loin possible de soi.
5. Placer la pince de masse le plus près possible de la zone de soudage.

**Consignes relatives aux stimulateurs cardiaques :**
Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur médecin. Si ce dernier les déclare aptes, il leur est recommandé de respecter les consignes ci-dessus.

# SECTION 3 – DEFINITIONS

## 3-1. Symbol Definitions

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Engine Choke | | Read Operator's Manual | A | Amperes | V | Volts |
| | Engine Oil | | Fuel | | Battery (Engine) | | Engine |
| + | Positive | — | Negative | ∿ | Alternating Current (AC) | | Output |
| h | Hours | s | Seconds | | Time | | Protective Earth (Ground) |
| | Circuit Breaker | | Temperature | | | | |

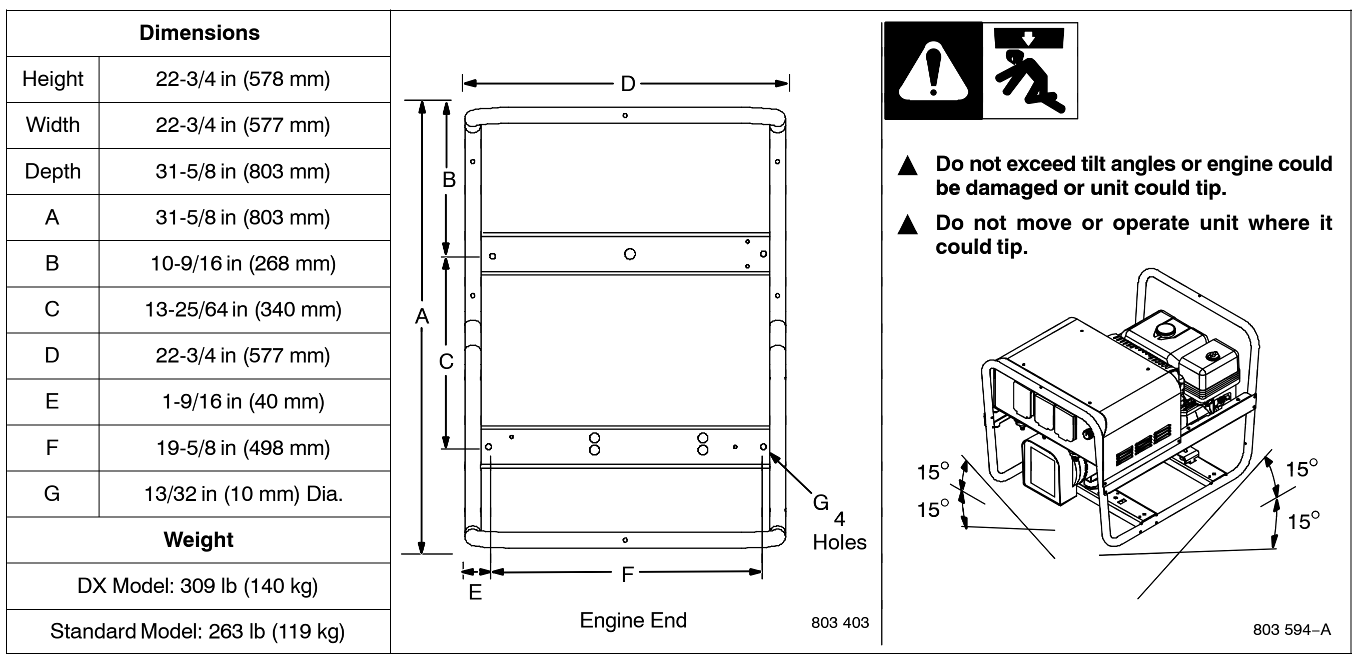
# SECTION 4 – SPECIFICATIONS

## 4-1. Weld, Power, And Engine Specifications

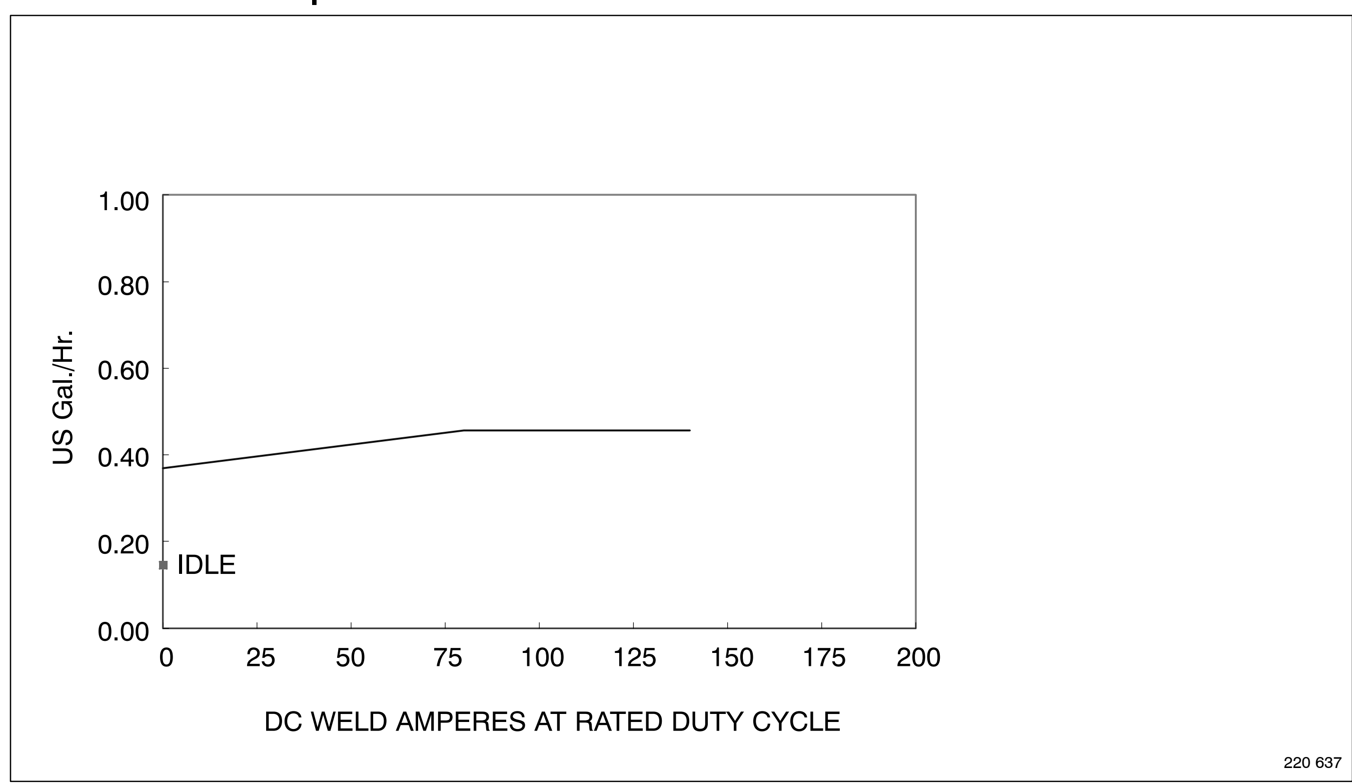
| Welding Mode | Weld Output Range | Rated Welding Output | Maximum Open Circuit Voltage | Generator Power Rating | Fuel Capacity | Engine |
|---|---|---|---|---|---|---|
| CC/DC | 50 – 140 A | 145 A, 25 V, 20% Duty Cycle<br>100 A, 25 V, 60% Duty Cycle<br>80 A, 25 V 100% Duty Cycle | 80 | Single-Phase, 4.5 kVA/kW (Peak) 4 kVA/kW (Continuous) 20/19 A, 120/240 V AC, 60 Hz | Standard Model: 1.8 gal (6.9 L) Tank<br>DX Model: 5 gal (19 L) Tank | Kohler CS10 Air-Cooled, One-Cylinder, Four-Cycle, 10 HP (300 CC), Gasoline Engine<br>(Recoil Or Electric-Start) |

## 4-2. Dimensions, Weights, And Operating Angles

| Dimensions | |
|---|---|
| Height | 22-3/4 in (578 mm) |
| Width | 22-3/4 in (577 mm) |
| Depth | 31-5/8 in (803 mm) |
| A | 31-5/8 in (803 mm) |
| B | 10-9/16 in (268 mm) |
| C | 13-25/64 in (340 mm) |
| D | 22-3/4 in (577 mm) |
| E | 1-9/16 in (40 mm) |
| F | 19-5/8 in (498 mm) |
| G | 13/32 in (10 mm) Dia. |
| **Weight** | |
| DX Model: 309 lb (140 kg) | |
| Standard Model: 263 lb (119 kg) | |



## 4-3. Fuel Consumption




## 4-4. Duty Cycle

Duty cycle is the percentage of 10 minutes that unit can weld at rated load without overheating.

▲ **Exceeding duty cycle can damage unit and void warranty.**

Continuous Welding

**100% Duty Cycle at 80 Amperes CC/DC**

2 Minutes Welding

8 Minutes Resting

**20% Duty Cycle at 145 Amperes CC/DC**

WELD AMPERES

160
140
120
100
80
60
40
20
0

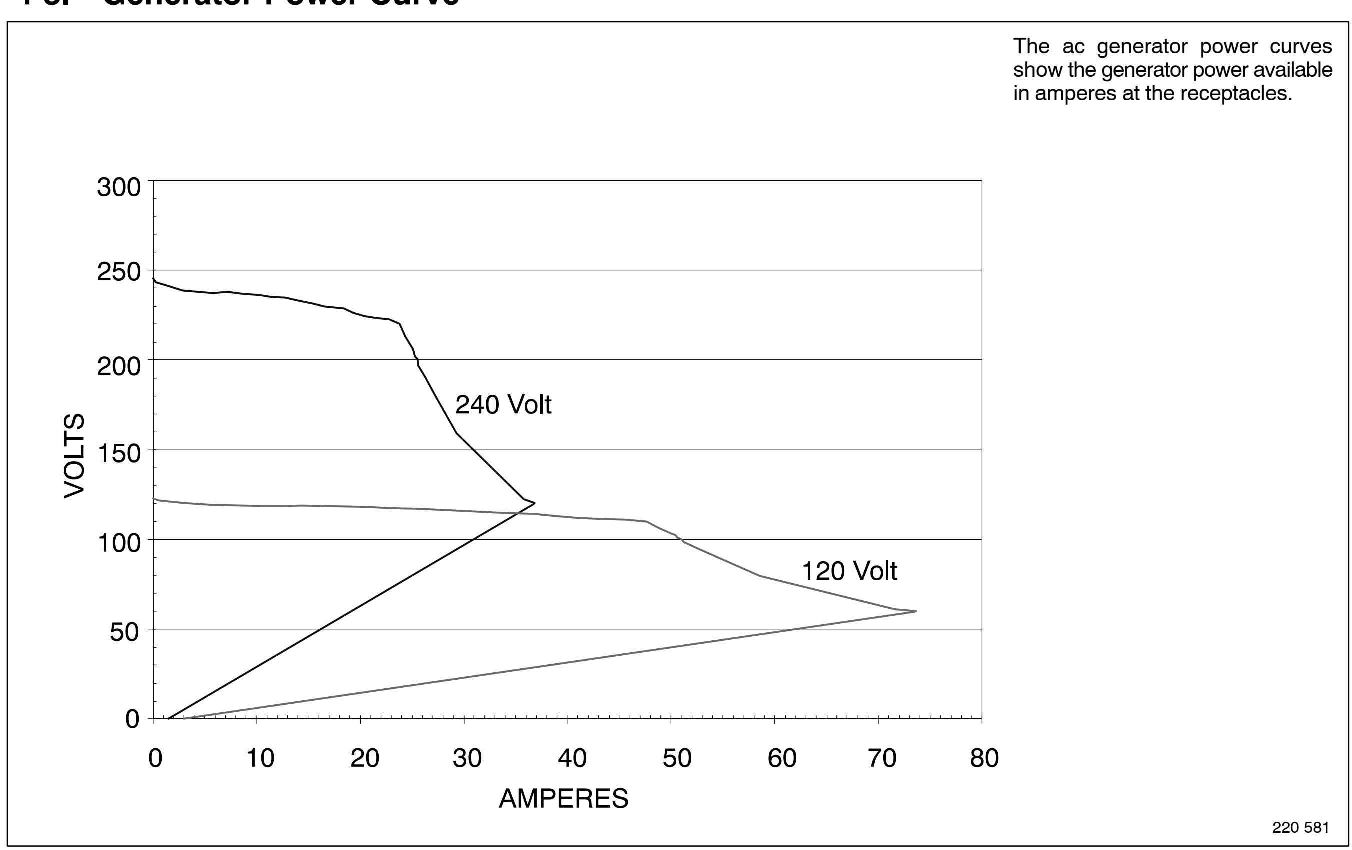
0 10 20 30 40 50 60 70 80 90 100

% DUTY CYCLE

220 625–A

## 4-5. Generator Power Curve

The ac generator power curves show the generator power available in amperes at the receptacles.




220 581

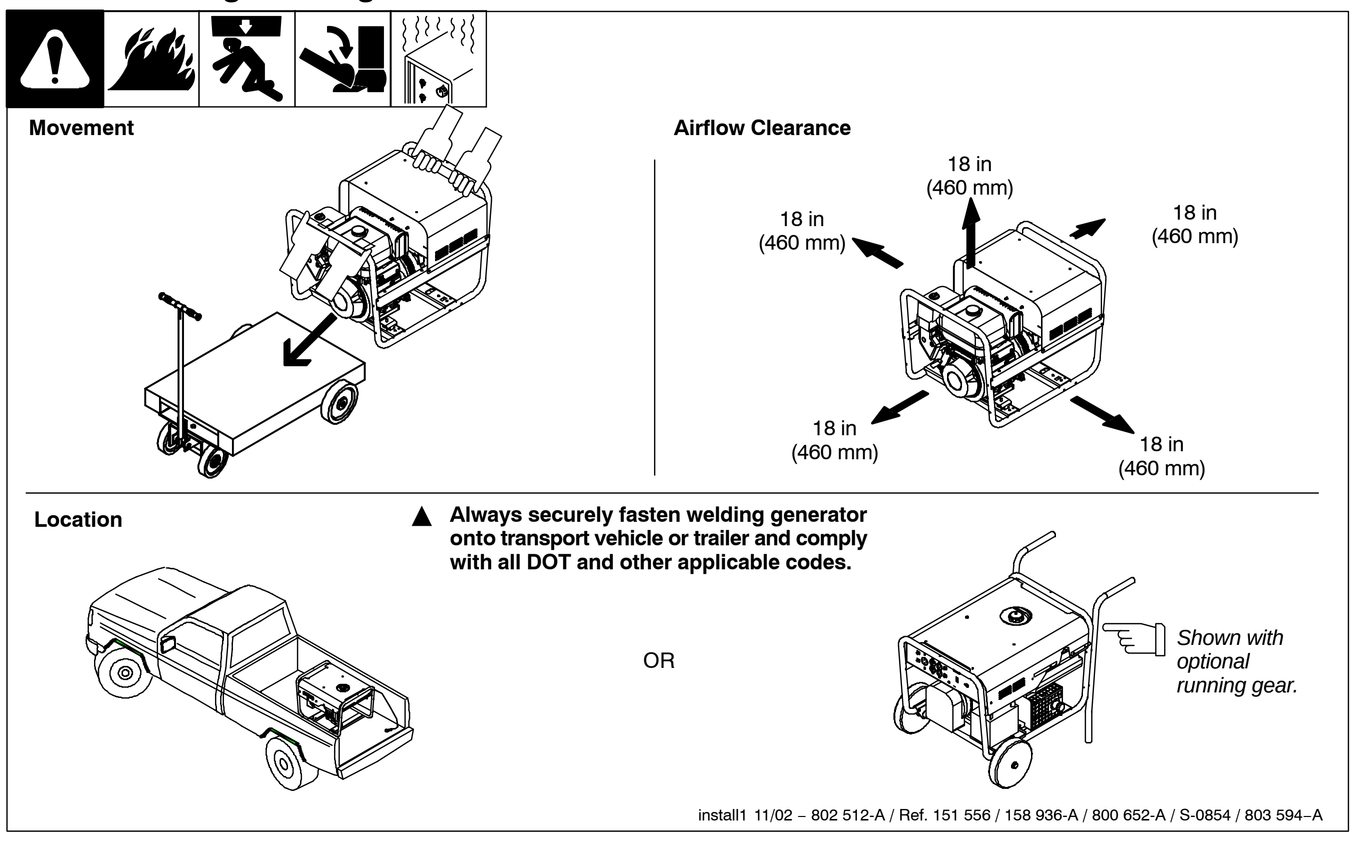
## 4-6. Volt-Ampere Curves

The volt-ampere curve shows the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of all other settings fall between the curves shown.

220 602

# SECTION 5 – INSTALLATION

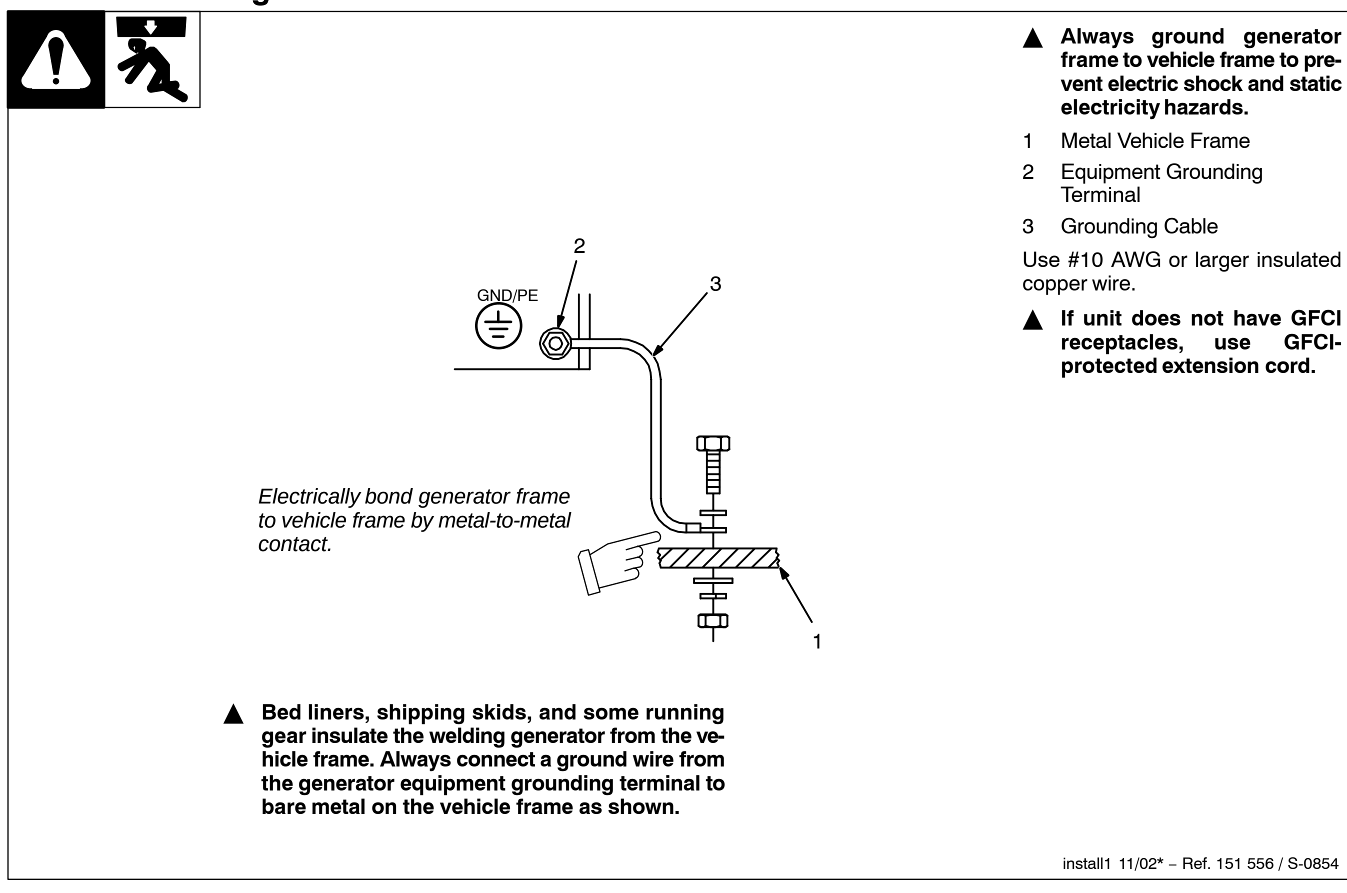
## 5-1. Installing Welding Generator




▲ **Always securely fasten welding generator onto transport vehicle or trailer and comply with all DOT and other applicable codes.**

install1 11/02 – 802 512-A / Ref. 151 556 / 158 936-A / 800 652-A / S-0854 / 803 594–A

## 5-2. Grounding Generator To Truck Or Trailer Frame




▲ **Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.**

1 Metal Vehicle Frame

2 Equipment Grounding Terminal

3 Grounding Cable

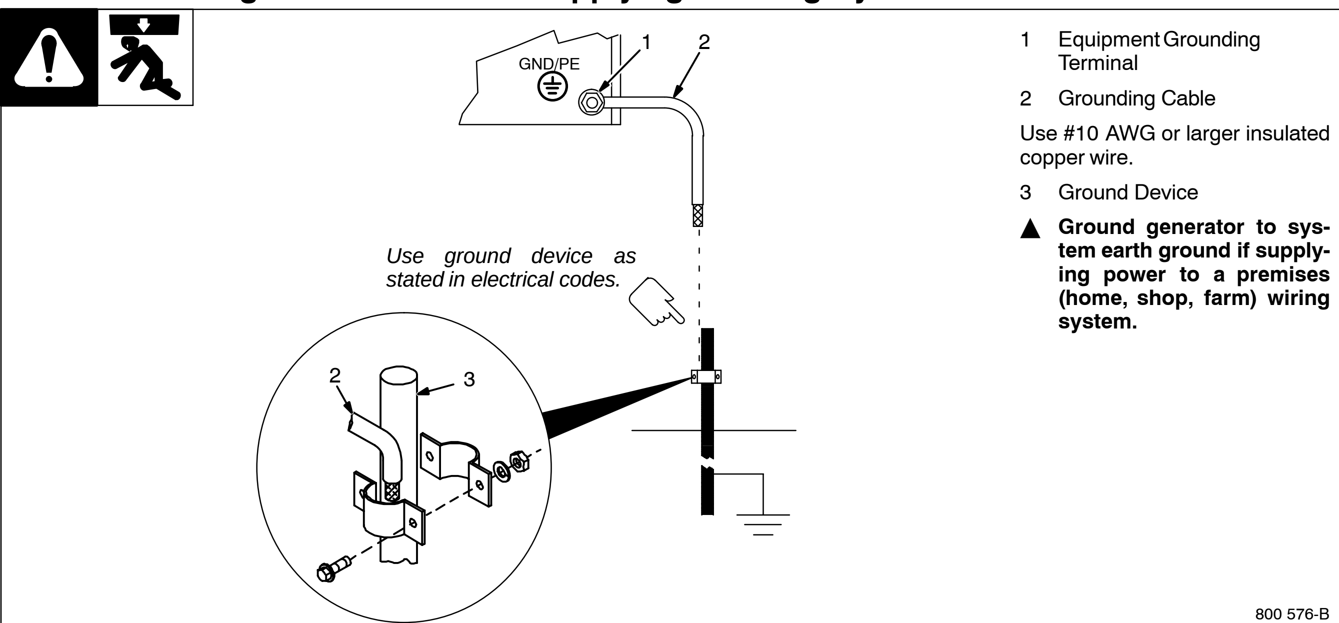
Use #10 AWG or larger insulated copper wire.

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

▲ **Bed liners, shipping skids, and some running gear insulate the welding generator from the vehicle frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.**

install1 11/02* – Ref. 151 556 / S-0854

## 5-3. Grounding Generator When Supplying Building Systems




1 Equipment Grounding Terminal

2 Grounding Cable

Use #10 AWG or larger insulated copper wire.

3 Ground Device

▲ **Ground generator to system earth ground if supplying power to a premises (home, shop, farm) wiring system.**

## 5-4. Engine Prestart Checks − Standard Model

1/2 in (13 mm)

Full

Gasoline

1

Full

☞ *Fuel valve is shown in the open position. Always close fuel valve after stopping unit. Moving unit with fuel valve open may cause carburetor flooding and make starting difficult.*

Check all fluids daily. Engine must be cold and on a level surface. Unit is shipped with 10W30 engine oil.

1 Fuel Valve

Open valve.

☞ *Close fuel valve before moving unit or carburetor may flood and make starting difficult.*

**Fuel**

Add fresh fuel before starting engine the first time (see engine manual for specifications). Fill fuel tank up to 1/2 in. (13 mm) from top to allow room for expansion. Check fuel level on a cold engine before use each day.

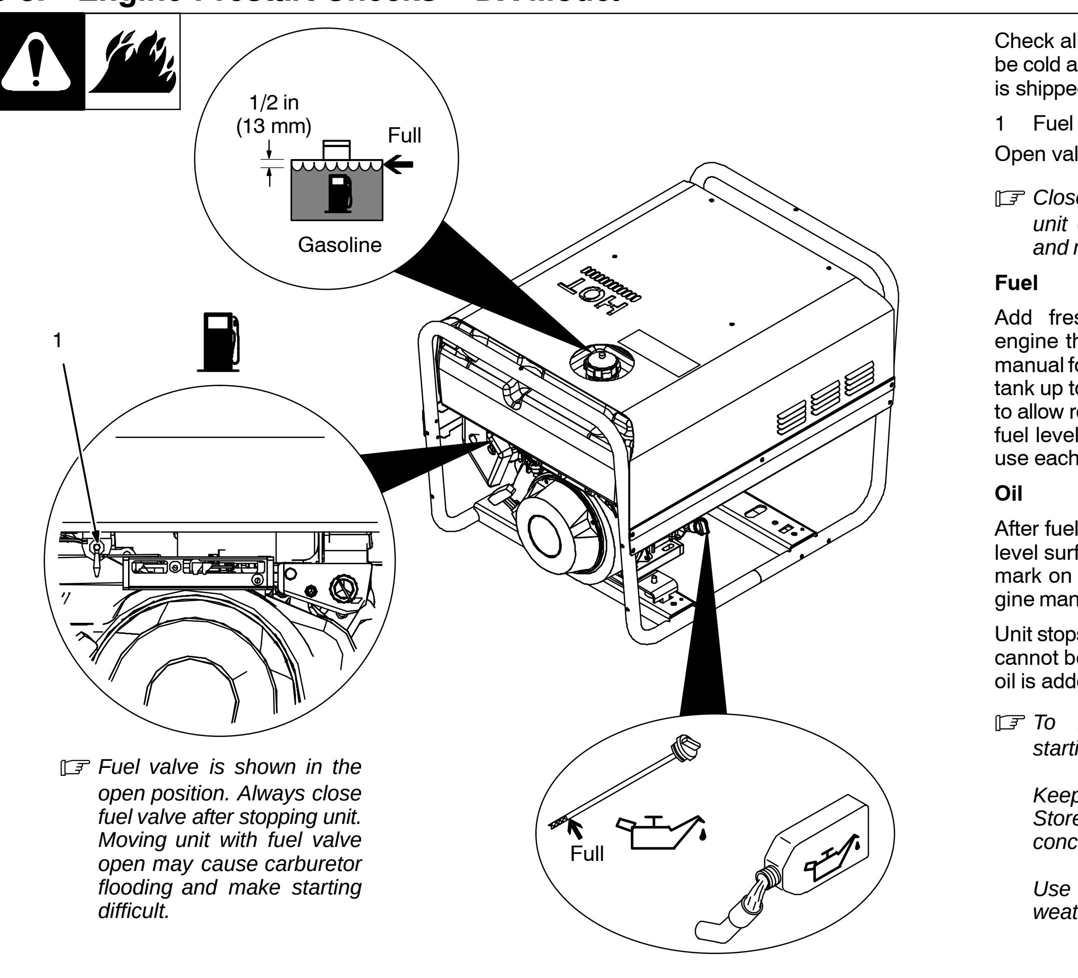
**Oil**

After fueling, check oil with unit on level surface. If oil is not up to full mark on dipstick, add oil (see engine manual).

Unit stops if oil level is too low. Unit cannot be restarted until sufficient oil is added.

Ref. 802 594−A / 803 400

## 5-5. Engine Prestart Checks − DX Model




☞ *Fuel valve is shown in the open position. Always close fuel valve after stopping unit. Moving unit with fuel valve open may cause carburetor flooding and make starting difficult.*

Check all fluids daily. Engine must be cold and on a level surface. Unit is shipped with 10W30 engine oil.

1 Fuel Valve

Open valve.

☞ *Close fuel valve before moving unit or carburetor may flood and make starting difficult.*

**Fuel**

Add fresh fuel before starting engine the first time (see engine manual for specifications). Fill fuel tank up to 1/2 in. (13 mm) from top to allow room for expansion. Check fuel level on a cold engine before use each day.

**Oil**

After fueling, check oil with unit on level surface. If oil is not up to full mark on dipstick, add oil (see engine manual).

Unit stops if oil level is too low. Unit cannot be restarted until sufficient oil is added.

☞ *To improve cold weather starting:*

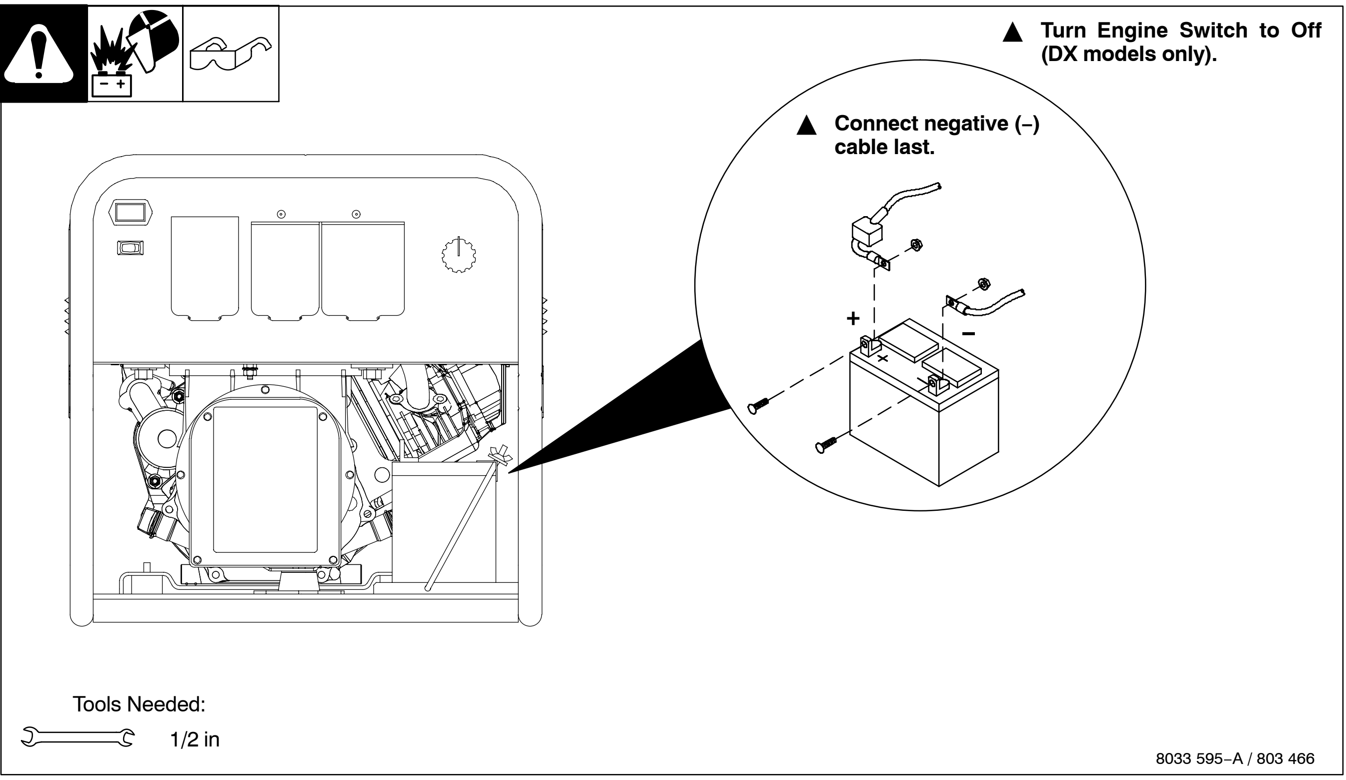
*Keep battery in good condition. Store battery in warm area off concrete surface.*

*Use correct grade oil for cold weather.*

803 595−A

## 5-6. Connecting The Battery (DX Models Only)

▲ **Turn Engine Switch to Off (DX models only).**

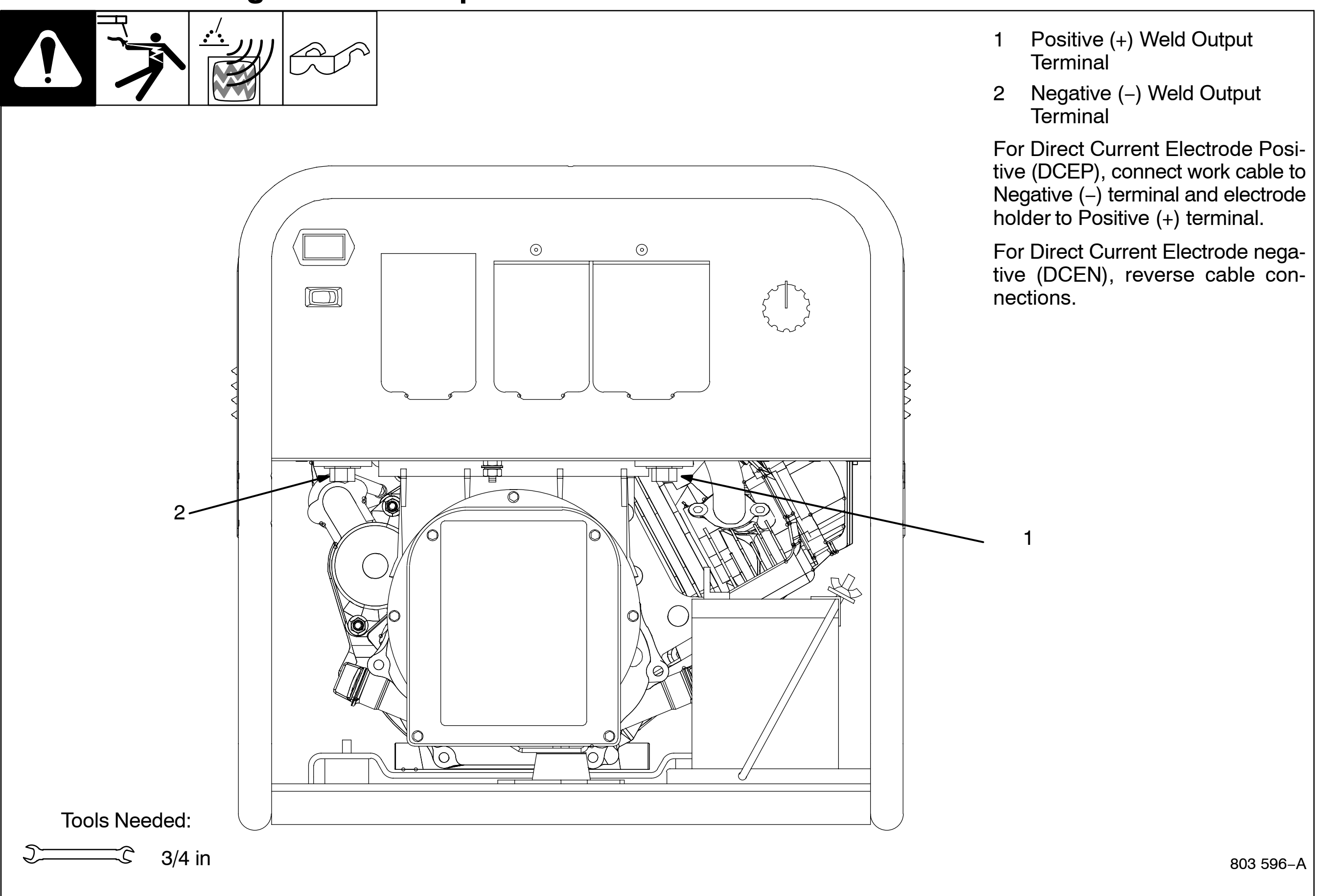



Tools Needed:

1/2 in

8033 595−A / 803 466

## 5-7. Connecting To Weld Output Terminals




1 Positive (+) Weld Output Terminal

2 Negative (−) Weld Output Terminal

For Direct Current Electrode Positive (DCEP), connect work cable to Negative (−) terminal and electrode holder to Positive (+) terminal.

For Direct Current Electrode negative (DCEN), reverse cable connections.

## 5-8. Selecting Weld Cable Sizes*

| Weld Output Terminals<br>▲ Turn off power before connecting to weld output terminals.<br>▲ Do not use worn, damaged, undersized, or poorly spliced cables. | Welding Amperes | Weld Cable Size** and Total Cable (Copper) Length in Weld Circuit Not Exceeding*** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 100 ft (30 m) or Less | | 150 ft (45 m) | 200 ft (60 m) | 250 ft (70 m) | 300 ft (90 m) | 350 ft (105 m) | 400 ft (120 m) |
| | | 10 – 60% Duty Cycle | 60 – 100% Duty Cycle | 10 – 100% Duty Cycle | | | | | |
| | 100 | 4 (20) | 4 (20) | 4 (20) | 3 (30) | 2 (35) | 1 (50) | 1/0 (60) | 1/0 (60) |
| | 150 | 3 (30) | 3 (30) | 2 (35) | 1 (50) | 1/0 (60) | 2/0 (70) | 3/0 (95) | 3/0 (95) |
| | 200 | 3 (30) | 2 (35) | 1 (50) | 1/0 (60) | 2/0 (70) | 3/0 (95) | 4/0 (120) | 4/0 (120) |
| | 250 | 2 (35) | 1 (50) | 1/0 (60) | 2/0 (70) | 3/0 (95) | 4/0 (120) | 2 ea. 2/0 (2x70) | 2 ea. 2/0 (2x70) |
| | 300 | 1 (50) | 1/0 (60) | 2/0 (70) | 3/0 (95) | 4/0 (120) | 2 ea. 2/0 (2x70) | 2 ea. 3/0 (2x95) | 2 ea. 3/0 (2x95) |

* This chart is a general guideline and may not suit all applications. If cable overheats, use next size larger cable.

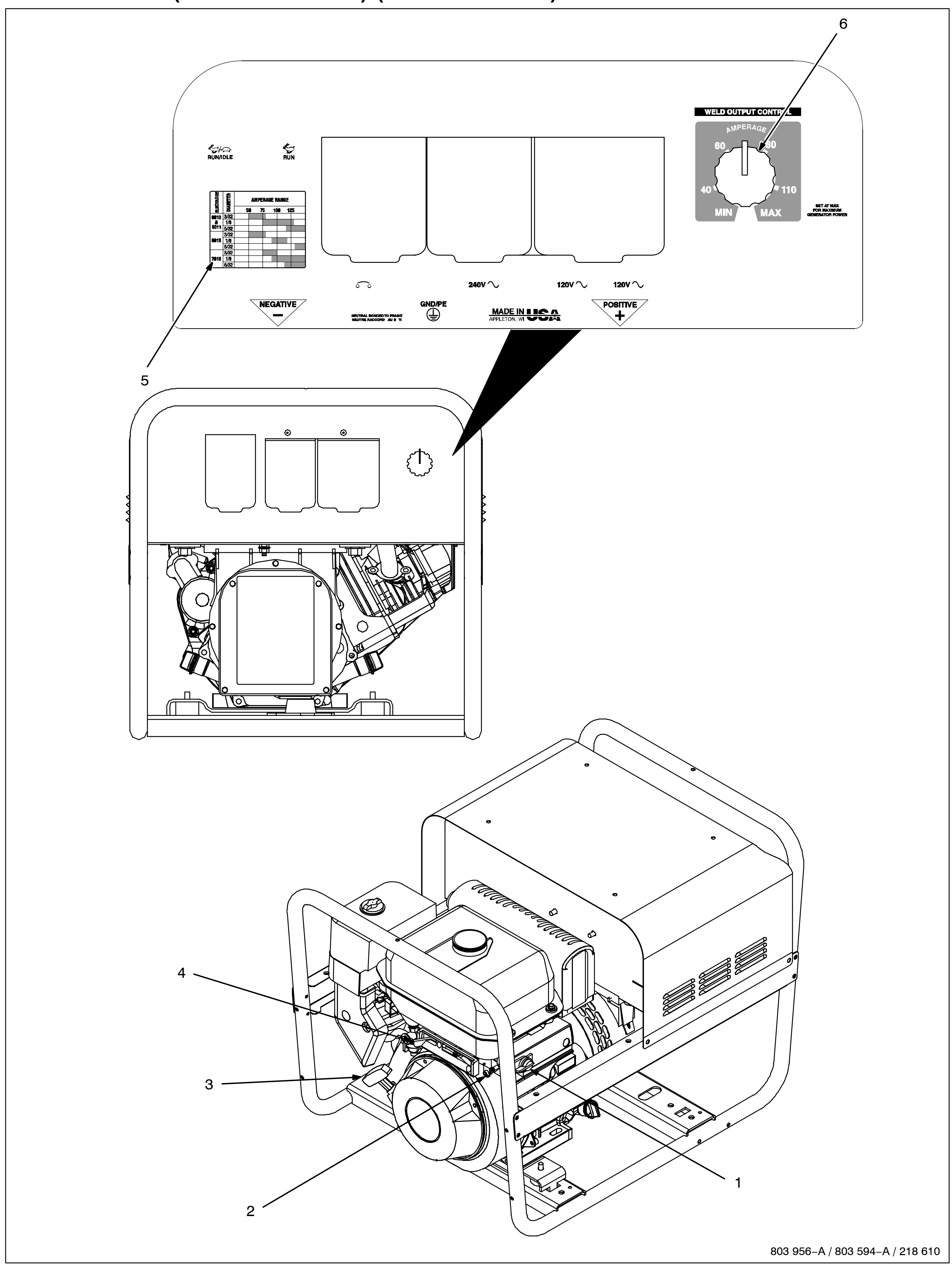
**Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.
( ) = $mm^2$ for metric use

S-0007-F

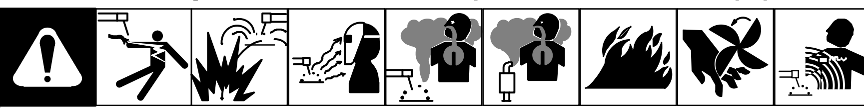
***For distances longer than those shown in this guide, call a factory applications representative at 920-735-4505.

# SECTION 6 – OPERATING THE WELDING GENERATOR

## 6-1. Controls (Standard Models) (See Section 6-2)



## 6-2. Description Of Controls (Standard Models) (See Section 6-1)



1 Engine Switch

Use switch to control ignition circuit. Turn switch to On position when starting engine. Turn switch to Off position to stop engine. Engine cannot be started with switch in the Off position.

Engine stops if oil level is too low. Engine cannot be restarted until sufficient oil is added.

2 Low Oil Pressure Light

Light goes on and engine stops if engine oil level is too low.

Engine cannot be restarted until sufficient oil is added.

▲ **Stop engine and add oil if light goes on (see Section 5-5).**

3 Starter Handle

4 Choke Control

Use control to change engine air/fuel mix. Move control to far right if starting a cold engine. Move control to far left if starting a warm engine.

**To Start**:

- Open fuel valve (see Section 5-5).
- Turn Engine switch to On.
- Set choke.
- Pull starter handle. Open choke as engine warms.

▲ **If the engine does not start, let engine come to a complete stop before attempting restart.**

**To Stop**:

- Turn Engine switch to Off.

☞ *Always close fuel valve after stopping unit. Moving unit with fuel valve open may cause carburetor flooding and make starting difficult.*

5 Welding Range Table

Use table to determine correct weld amperage based on electrode size, type, and material thickness.

6 Weld Output Control

☞ *Set control at maximum for full generator power output at AC receptacles*

Use control to select weld amperage. Control may be adjusted while welding.

**To Set Weld Output Control:** Use table to determine correct size electrode for weld amperage. Select electrode type and set control to corresponding amperage range on nameplate. Adjust control to obtain desired weld performance.

EXAMPLE:

Electrode Diameter: 1/8

Electrode Type: E-6013

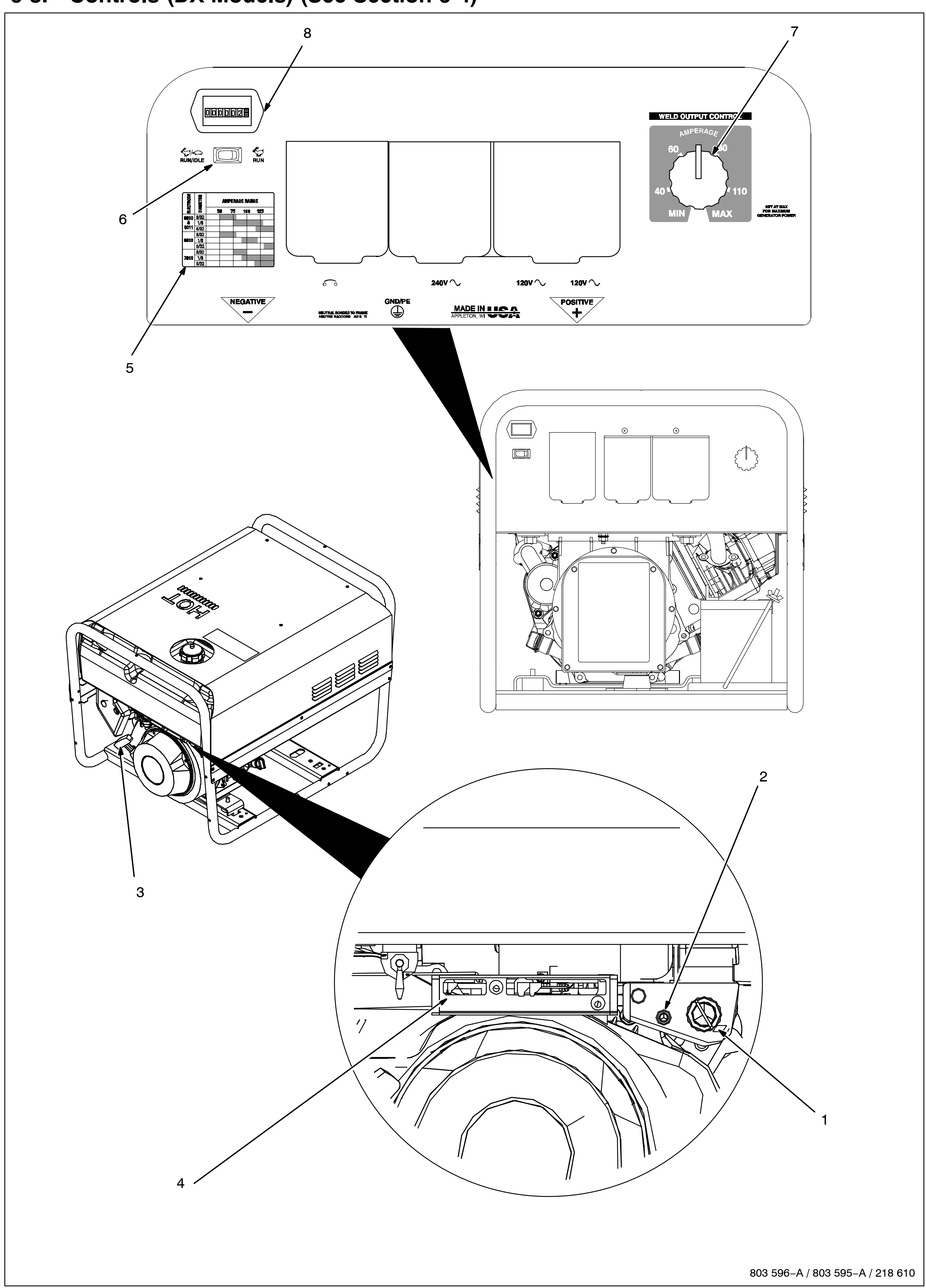
Current Control Setting: 90 – 120 A

# Notes

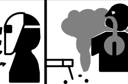
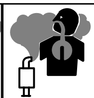
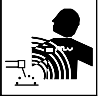
**Work like a Pro!**

**Pros weld and cut safely. Read the safety rules at the beginning of this manual.**

## 6-3. Controls (DX Models) (See Section 6-4)



## 6-4. Description Of Controls (DX Models) (See Section 6-3)

1 Engine Switch

Use switch to control ignition circuit. Turn switch to Start position for electric start. Turn switch to On position to start engine using starter handle (recoil). Turn switch to Off position to stop engine.

2 Low Oil Level Light

Light goes on and engine stops if engine oil level is too low.

Engine cannot be restarted until sufficient oil is added.

▲ **Stop engine and add oil if light goes on (see Section 5-5).**

3 Starter Handle

Use starter handle to start unit if electric start does not work.

4 Choke Control

Use control to change engine air/fuel mix. Move control to far right if starting a cold engine. Move control to far left if starting a warm engine.

The engine starts at weld/power speed and runs at weld/power speed under weld or generator power load. The engine returns to idle speed 12 seconds after start-up or after weld or generator power load is removed.

**To Start**:

- Open fuel valve (see Section 5-5).
- Set choke.
- Electric-Start: Turn Engine switch to Start position.
  Recoil: Turn Engine switch to On position. Pull starter handle until engine starts.
- Open choke as engine warms.

▲ **If the engine does not start, let engine come to a complete stop before attempting restart.**

**To Stop**:

- Turn Engine switch to Off.

☞ *Always close fuel valve after stopping unit. Moving unit with fuel valve open may cause carburetor flooding and make starting difficult.*

5 Welding Range Table

Use table to determine correct weld amperage based on electrode size, type, and material thickness.

6 Run / Idle Switch

Use switch to select whether the engine stays at run speed continuously or whether the auto idle feature is enabled so engine speed returns to idle speed after start−up or after weld or generator load is removed.

7 Weld Output Control

☞ Set control at maximum for full generator power output at AC receptacles.

Use control to select weld amperage. Control may be adjusted while welding.

**To Set Weld Output Control:** Use table to determine correct size electrode for weld amperage. Select electrode type and set control to corresponding amperage range on nameplate. Adjust control to obtain desired weld performance.

EXAMPLE:

Electrode Diameter: 1/8

Electrode Type: E-6013

Current Control Setting: 90 − 120 A

8 Hourmeter

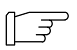
Use hourmeter to help schedule routine maintenance.

# Notes

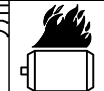
**Work like a Pro!**

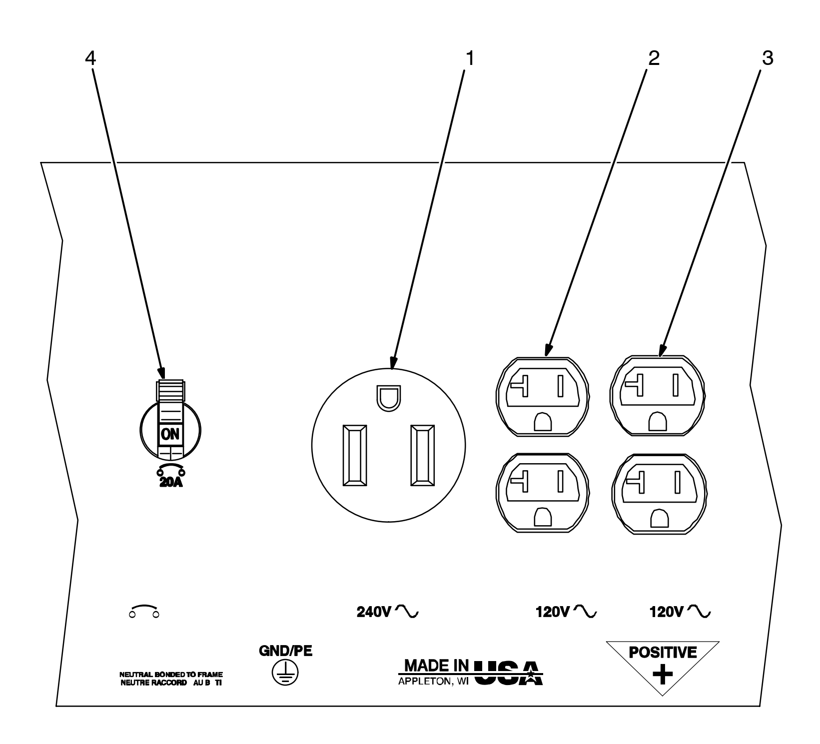
**Pros weld and cut safely. Read the safety rules at the beginning of this manual.**

# SECTION 7 – OPERATING AUXILIARY EQUIPMENT

| NOTE  | *Set Current control to maximum for full generator power output at AC receptacles.* |
|---|---|

## 7-1. Generator Power Panel Receptacles




218 610–B

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

☞ *Generator power decreases as weld current increases.*

1 240 V AC Receptacle RC1

RC1 supplies 60 Hz single-phase power at weld/power speed. Maximum output is 4.5 kVA/kW (peak) or 4 kVA/kW (continuous).

2 120 V 20 A AC Duplex Receptacle RC2

3 120 V 20 A AC Duplex Receptacle RC3

RC2 and RC3 supply 60 Hz single-phase power at weld/power speed. Maximum output from RC2 or RC3 is 2.4 kVA/kW.

☞ *Do not parallel the two 120V duplex receptacles.*

4 Circuit Breaker CB1

CB1 protects the receptacles from overload. If CB1 opens, the receptacles do not work. Move switch to the On position to reset breaker.

☞ *If breaker continues to open, contact Factory Authorized Service Agent.*

Combined output of all receptacles limited to 4 kVA/kW continuous rating of the generator (See Section 11 – Generator Power Guidelines).

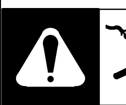
EXAMPLE: If 10 A is drawn from each 120 volt duplex receptacle, only 6 A is available from the 240 V receptacle.

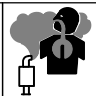
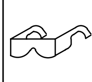
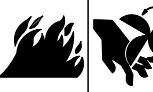
2 x (120 V x 10 A) + (240 V x 6 A) = 4 kVA/KW.

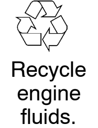
# SECTION 8 – MAINTENANCE

**NOTE** ☞ *Follow the storage procedure in the engine owner's manual if the unit will not be used for an extended period.*

## 8-1. Routine Maintenance





Recycle engine fluids.

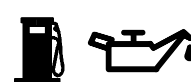
▲ **Stop engine before maintaining.**

☞ *See Engine Manual for important start-up, service, and storage information. Service more often if used in severe conditions.*

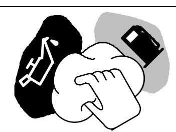
* To be done by Factory Authorized Service Agent.

### 8 h

Check fluid levels. See Section 5-5.

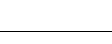


Wipe up spills.





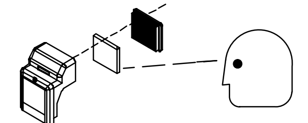
### 25 h



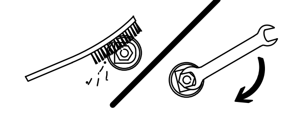


### 50 h

Service precleaner element (DX Model Shown)

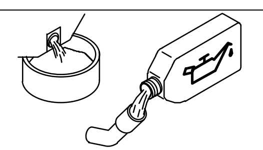


Clean and tighten weld terminals.

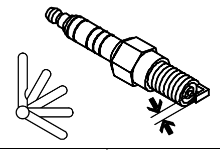


### 100 h

Change oil. See engine manual.

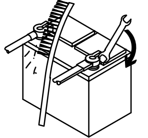


Check spark plug.

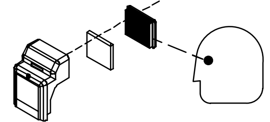


Service spark arrestor (optional on DX Models).

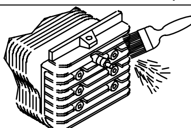
Clean and tighten battery connections (DX models only).



Replace air cleaner element.

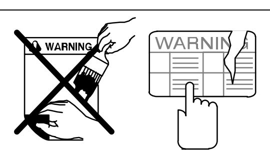


Clean cooling system. See Engine Manual.



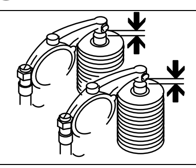
### 200 h

Replace unreadable labels.



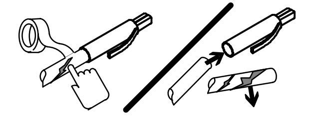

### 300 h

Check valve clearance.*

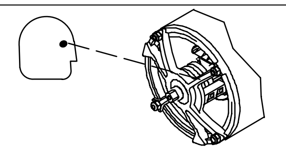


### 500 h

Repair or replace cracked cables.

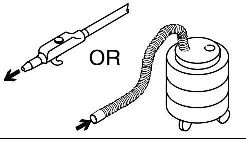


Service welding generator brushes and slip rings. Service more often in dirty conditions.*



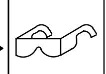
### 1000 h

Blow out or vacuum inside. During heavy service, clean monthly.



## 8-2. Servicing Air Cleaner





▲ **Stop engine.**

▲ **Do not run engine without air cleaner or with dirty element.**

1 Precleaner

2 Paper Element

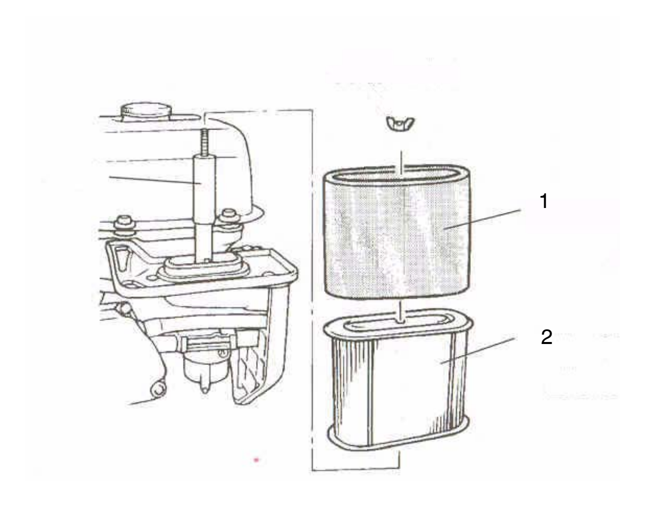
☞ *Do not wash paper element or clean with compressed air.*

Remove cover.

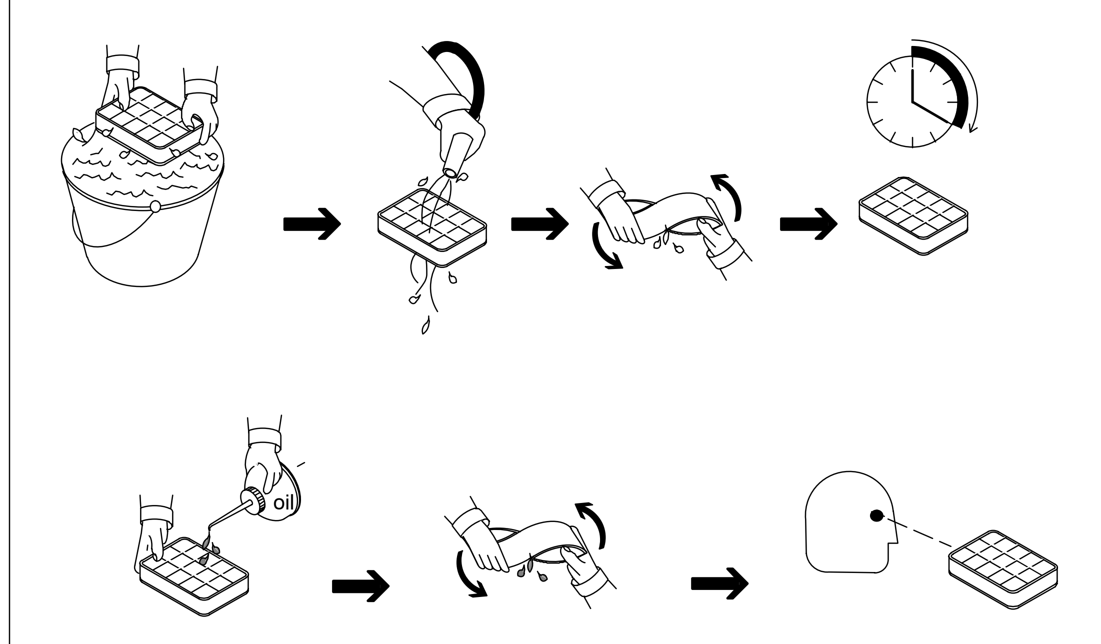
Wash precleaner with soap and water solution. Allow precleaner to air dry completely.

Dip precleaner in clean engine oil. Squeeze out excess oil. The engine will smoke if precleaner contains too much oil.

Replace paper element if dirty, oily, or damaged.

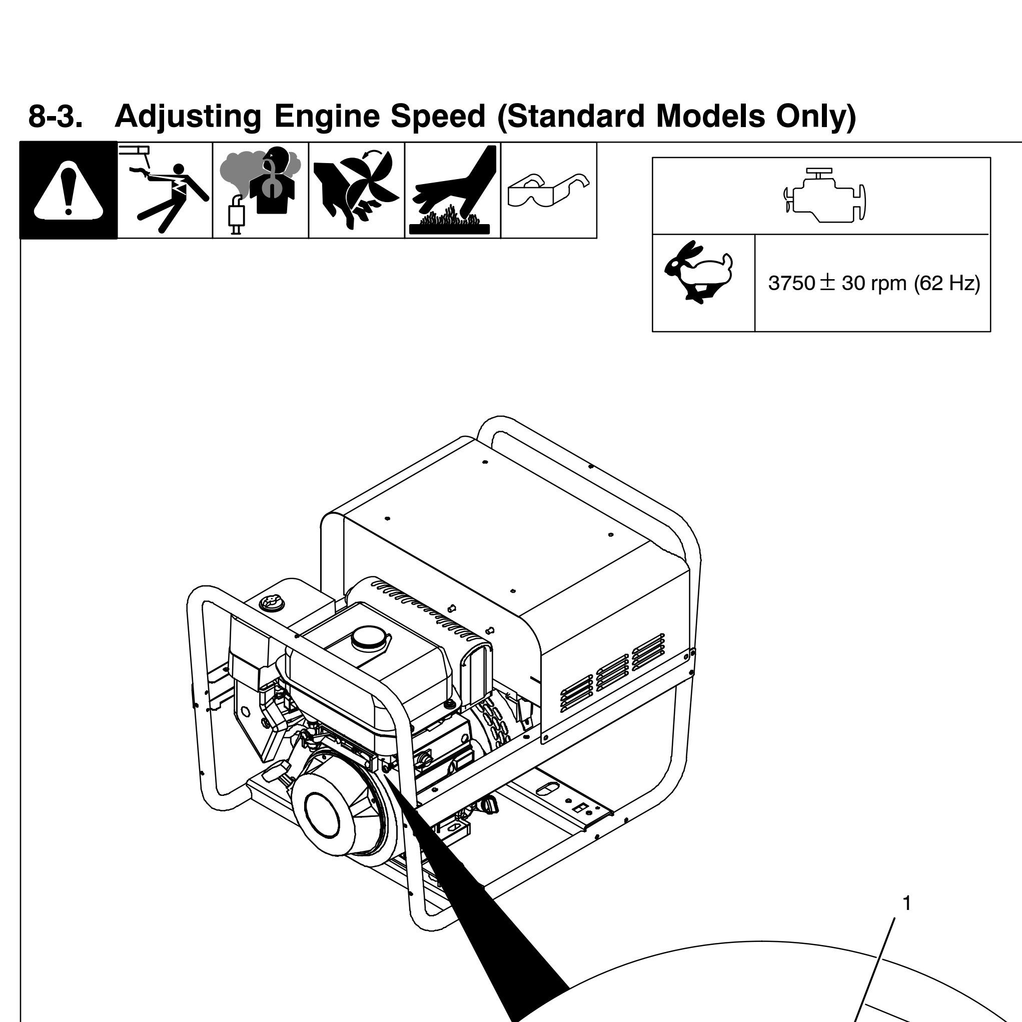



**Standard Model Shown**




aircleaner6 9/00 – 803 404

## 8-3. Adjusting Engine Speed (Standard Models Only)



| | |
|---|---|
| | 3750 ± 30 rpm (62 Hz) |

After tuning engine, check engine speed. See table for proper no load speed. If necessary, adjust speed as follows:

Start engine and run until warm.

1 Adjustment Screw

To increase speed, turn screw in (clockwise). To decrease speed, turn screw out (counterclockwise).

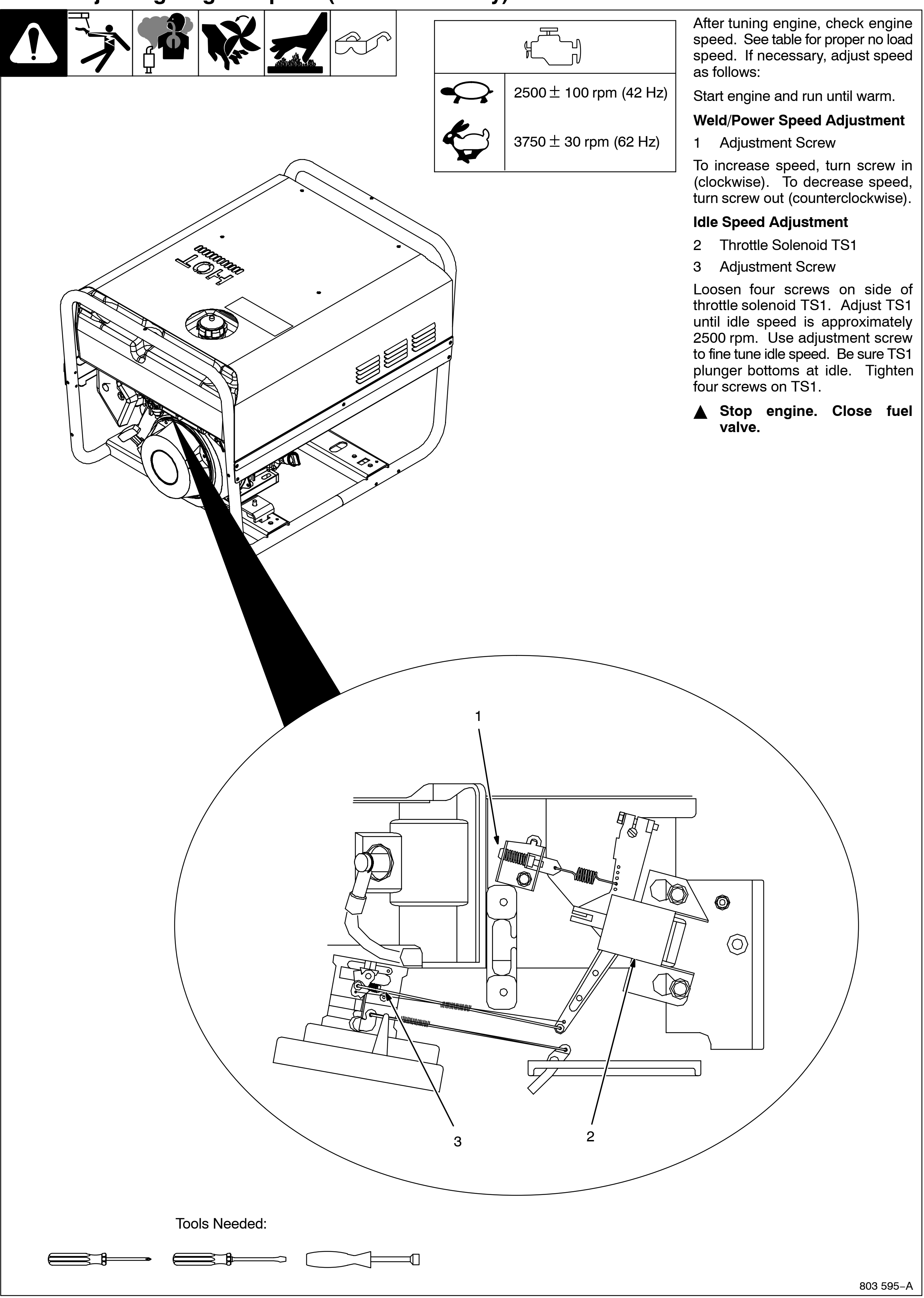
▲ **Stop engine. Close fuel valve.**

1

Tools Needed:

803 594–A

## 8-4. Adjusting Engine Speed (DX Models Only)




After tuning engine, check engine speed. See table for proper no load speed. If necessary, adjust speed as follows:

Start engine and run until warm.

**Weld/Power Speed Adjustment**

1 Adjustment Screw

To increase speed, turn screw in (clockwise). To decrease speed, turn screw out (counterclockwise).

**Idle Speed Adjustment**

2 Throttle Solenoid TS1

3 Adjustment Screw

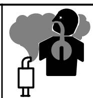
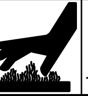
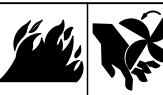
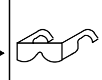
Loosen four screws on side of throttle solenoid TS1. Adjust TS1 until idle speed is approximately 2500 rpm. Use adjustment screw to fine tune idle speed. Be sure TS1 plunger bottoms at idle. Tighten four screws on TS1.

▲ **Stop engine. Close fuel valve.**

# SECTION 9 – TROUBLESHOOTING

## 9-1. Troubleshooting



### A. Welding

| Trouble | Remedy |
|---|---|
| No weld output or generator power output at ac receptacles. | Be sure all equipment is disconnected from receptacles when starting unit. |
| | Have Factory Authorized Service Agent check brushes, slip rings, rotor, stator, integrated rectifier SR2, and Weld Output control R1. |
| No weld output; generator power output okay at ac receptacles. | Check Weld Output control setting. |
| | Check weld connections. |
| | Have Factory Authorized Service Agent check Weld Output control R1, stator, integrated rectifier SR2, stabilizer DC-Z, main rectifier SR1, and reactor AC-Z |
| Low weld output. | Check Weld Output control setting. |
| | Check engine speed, and adjust if necessary (see Section 8-3 or 8-4). |
| | Service engine air cleaner. |
| | Check weld cable size and length. |
| | Have Factory Authorized Service Agent check Weld Output control R1, stator, integrated rectifier SR2, stabilizer DC-Z, main rectifier SR1, and reactor AC-Z |
| High weld output. | Check Weld Output control setting. |
| | Check engine speed, and adjust if necessary (see Section 8-3 or 8-4). |
| Erratic weld output. | Check Weld Output control setting. |
| | Tighten and clean connections to electrode and workpiece. |
| | Use dry, properly-stored electrodes for Stick welding. |
| | Remove excessive coils from weld cables. |
| | Clean and tighten connections both inside and outside welding generator. |
| | Check engine speed, and adjust if necessary (see Section 8-3 or 8-4). |
| | Check throttle/governor linkage for smooth, non-binding operation. |

### B. Generator Power

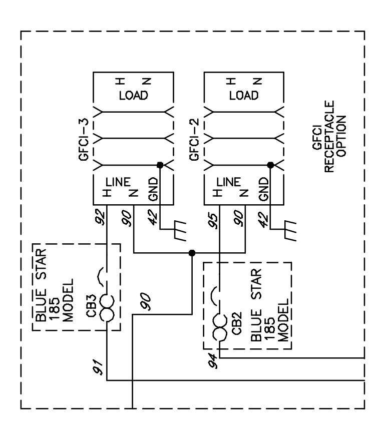
| Trouble | Remedy |
|---|---|
| No output at generator power ac receptacles; no weld output. | Be sure all equipment is disconnected from receptacles when starting unit. |
| | Have Factory Authorized Service Agent check brushes, slip rings, rotor, stator, integrated rectifier SR2, and Weld Output control R1. |
| No output at generator power ac receptacles; weld output okay. | Reset and check circuit breaker (see Section 7-1). |
| | Check receptacle wiring and connections. |
| | Have Factory Authorized Service Agent check stator windings and connections at terminal block 1T. |
| High output at generator power ac receptacles. | Check engine speed, and adjust if necessary (see Section 8-3 or 8-4). |

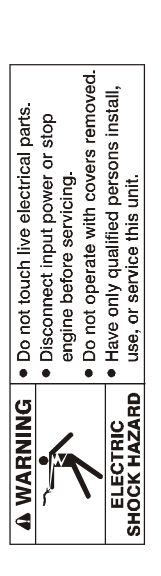
| Trouble | Remedy |
| --- | --- |
| Low output at generator power ac receptacles. | Check Weld Output control setting. |
| | Check engine speed, and adjust if necessary (see Section 8-3 or 8-4). Open circuit voltage is reduced as engine speed drops. |
| Erratic output at generator power ac receptacles. | Check fuel level. |
| | Have Factory Authorized Service Agent check connections at terminal block 1T. |
| | Check receptacle circuit breaker(s), wiring, and connections. |
| | Check throttle linkage for smooth, non-binding operation. |
| | Service air cleaner according to engine manual. |
| | Check engine speed, and adjust if necessary (see Section 8-3 or 8-4). |

## C. Engine

| Trouble | Remedy |
| --- | --- |
| Engine will not crank (DX models only). | Check and replace ignition fuse (see engine manual). |
| | Check battery voltage. |
| | Check battery connections and tighten if necessary. |
| | Have Factory Authorized Service Agent check engine ignition circuit. |
| Engine will not start. | Check fuel level (see Section 5-5). |
| | Move choke control to correct position (see Section 6-1 or 6-3). |
| | Open fuel valve (see Section 5-5). Close fuel valve before moving unit or carburetor may flood and make starting difficult. |
| | Check battery voltage (DX models only). |
| | Check battery connections and tighten if necessary (DX models only). |
| | Check oil level (see Section 5-5). Engine stops if oil level is too low. Refill crankcase with proper viscosity oil for operating temperature. |
| | Have Factory Authorized Service Agent check low oil level shutdown switch. |
| Engine stopped during normal operation. | Check fuel level (see Section 5-5). |
| | Open fuel valve (see Section 5-5). Close fuel valve before moving unit or carburetor may flood and make starting difficult. |
| | Check oil level (see Section 5-5). Engine stops if oil level is too low. |
| Battery discharges between uses (DX models only). | Clean battery, terminals, and posts with baking soda and water solution; rinse with clear water. |
| | Periodically recharge battery (approximately every 3 months). |
| | Replace battery. |
| | Check engine battery charging circuit and connections according to engine manual. |
| Unstable or sluggish engine speeds. | Check engine speed, and adjust if necessary (see Section 8-3 or 8-4). |
| | Check throttle/governor linkage for smooth, non-binding operation. |
| | Tune-up engine according to engine manual. |

# SECTION 10 – ELECTRICAL DIAGRAMS

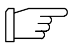



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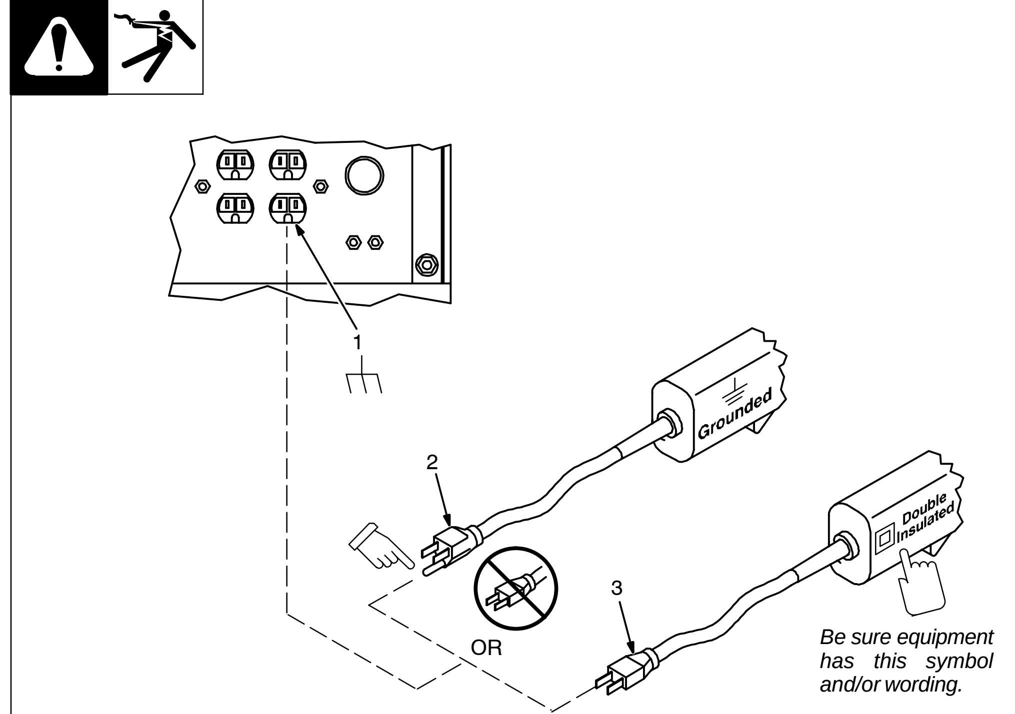
**Figure 10-1. Circuit Diagram For Welding Generator**

# SECTION 11 – GENERATOR POWER GUIDELINES

**NOTE** 

*The views in this section are intended to be representative of all engine-driven welding generators. Your unit may differ from those shown.*

## 11-1. Selecting Equipment




1 Generator Power Receptacles – Neutral Bonded To Frame

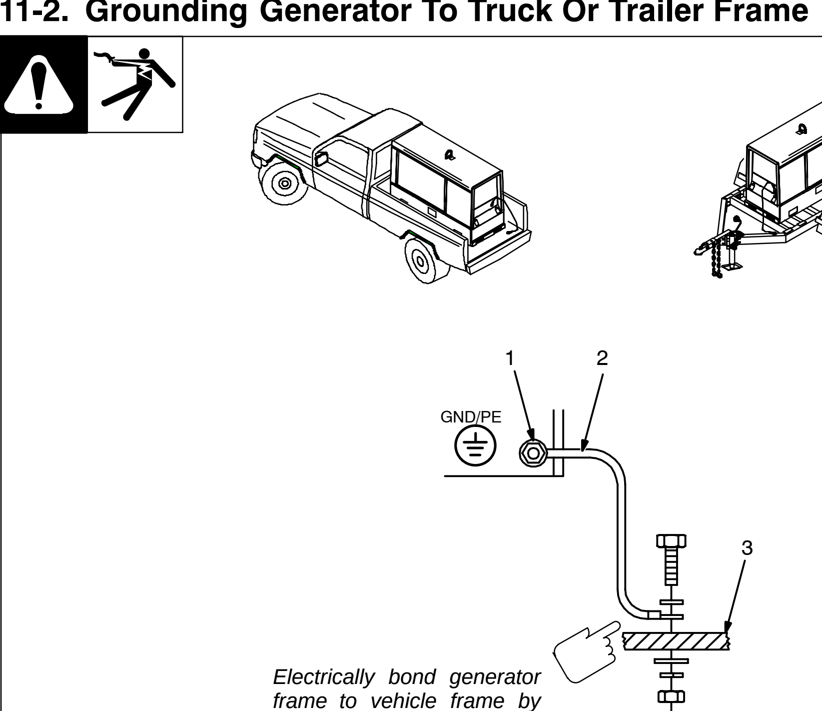
2 3-Prong Plug From Case Grounded Equipment

3 2-Prong Plug From Double Insulated Equipment

▲ **Do not use 2-prong plug unless equipment is double insulated.**

gen_pwr 11/02 – Ref. ST-159 730 / ST-800 577

## 11-2. Grounding Generator To Truck Or Trailer Frame




▲ **Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.**

1 Equipment Grounding Terminal (On Front Panel)

2 Grounding Cable (Not Supplied)

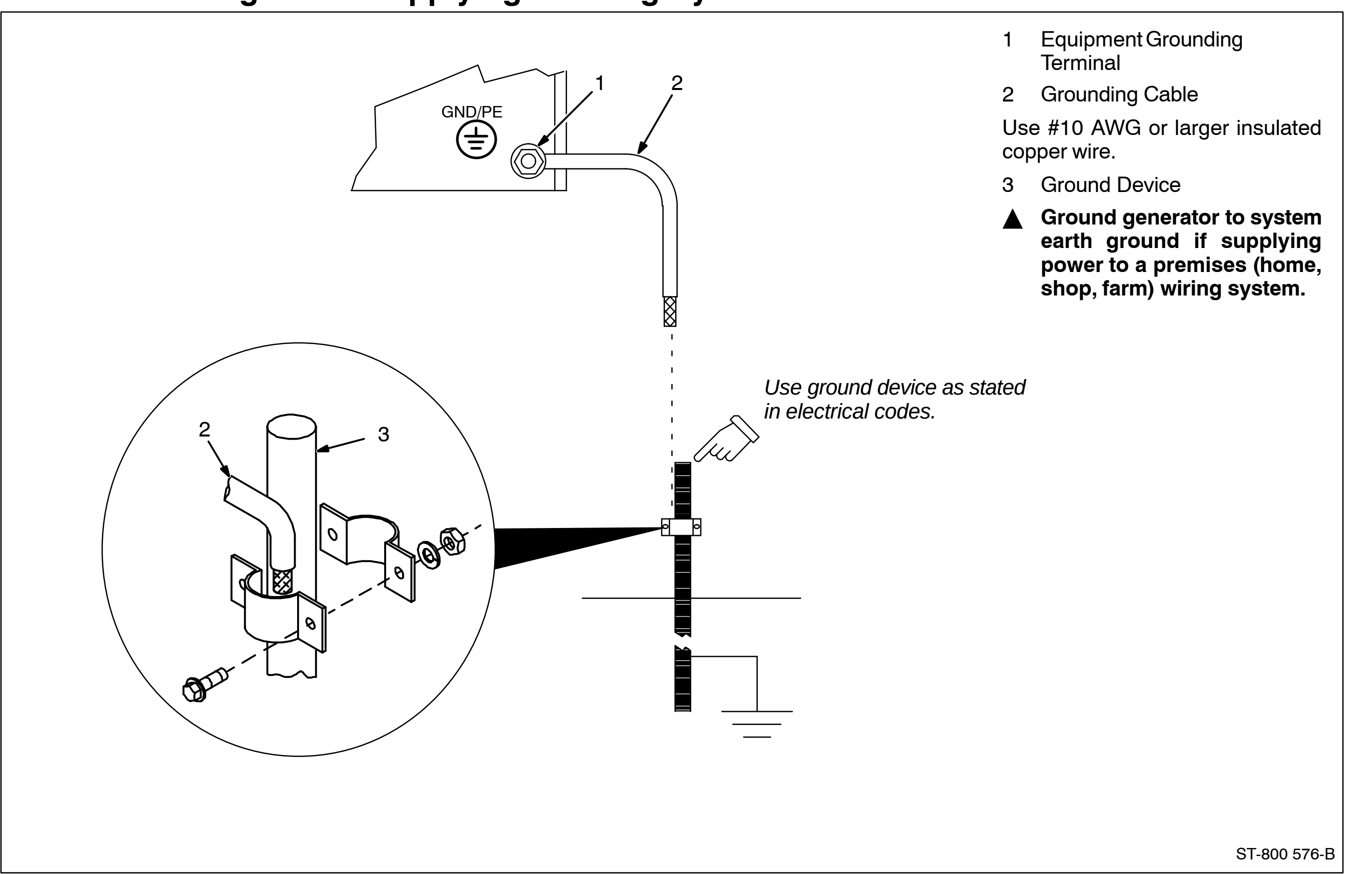
3 Metal Vehicle Frame

Connect cable from equipment ground terminal to metal vehicle frame. Use #10 AWG or larger insulated copper wire.

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

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## 11-3. Grounding When Supplying Building Systems




1 Equipment Grounding Terminal

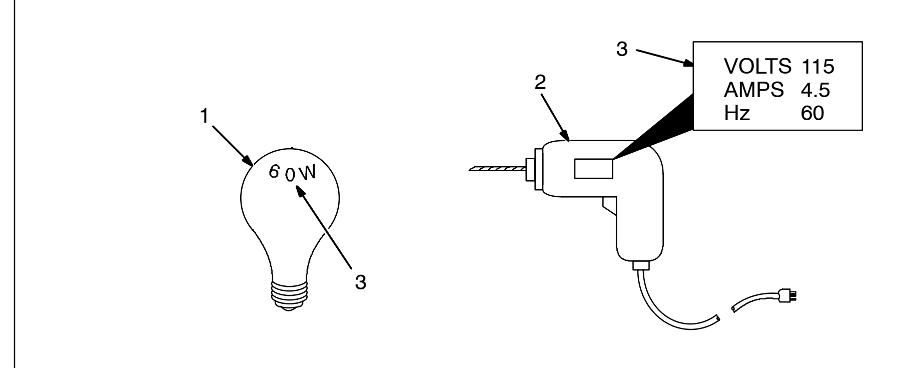
2 Grounding Cable

Use #10 AWG or larger insulated copper wire.

3 Ground Device

▲ **Ground generator to system earth ground if supplying power to a premises (home, shop, farm) wiring system.**

## 11-4. How Much Power Does Equipment Require?




1 Resistive Load

A light bulb is a resistive load and requires a constant amount of power.

2 Non-Resistive Load

Equipment with a motor is a non-resistive load and requires approximately six times more power while starting the motor than when running (see Section 11-8).

3 Rating Data

Rating shows volts and amperes, or watts required to run equipment.

**AMPERES x VOLTS = WATTS**

**EXAMPLE 1:** If a drill uses 4.5 amperes at 115 volts, calculate its running power requirement in watts.

4.5 A x 115 V = 520 W

The load applied by the drill is 520 watts.

**EXAMPLE 2:** If three 200 watt flood lamps are used with the drill from Example 1, add the individual loads to calculate total load.

(200 W + 200 W + 200 W) + 520 W = 1120 W

The total load applied by the three flood lamps and drill is 1120 watts.

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## 11-5. Approximate Power Requirements For Industrial Motors

| Industrial Motors | Rating | Starting Watts | Running Watts |
|---|---|---|---|
| Split Phase | 1/8 HP | 800 | 300 |
| | 1/6 HP | 1225 | 500 |
| | 1/4 HP | 1600 | 600 |
| | 1/3 HP | 2100 | 700 |
| | 1/2 HP | 3175 | 875 |
| Capacitor Start-Induction Run | 1/3 HP | 2020 | 720 |
| | 1/2 HP | 3075 | 975 |
| | 3/4 HP | 4500 | 1400 |
| | 1 HP | 6100 | 1600 |
| | 1-1/2 HP | 8200 | 2200 |
| | 2 HP | 10550 | 2850 |
| | 3 HP | 15900 | 3900 |
| | 5 HP | 23300 | 6800 |
| Capacitor Start-Capacitor Run | 1-1/2 HP | 8100 | 2000 |
| | 5 HP | 23300 | 6000 |
| | 7-1/2 HP | 35000 | 8000 |
| | 10 HP | 46700 | 10700 |
| Fan Duty | 1/8 HP | 1000 | 400 |
| | 1/6 HP | 1400 | 550 |
| | 1/4 HP | 1850 | 650 |
| | 1/3 HP | 2400 | 800 |
| | 1/2 HP | 3500 | 1100 |

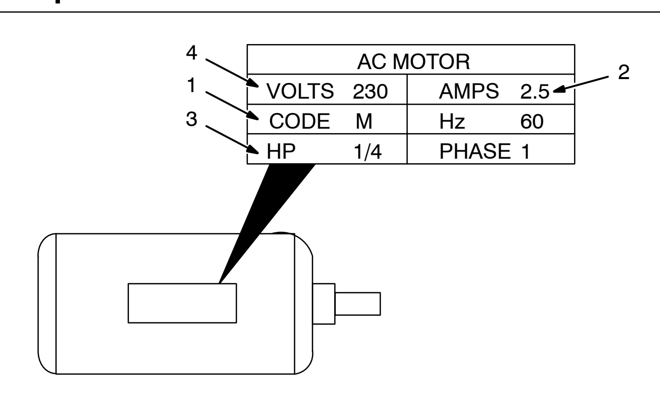
## 11-6. Approximate Power Requirements For Farm/Home Equipment

| Farm/Home Equipment | Rating | Starting Watts | Running Watts |
|---|---|---|---|
| Stock Tank De-Icer | | 1000 | 1000 |
| Grain Cleaner | 1/4 HP | 1650 | 650 |
| Portable Conveyor | 1/2 HP | 3400 | 1000 |
| Grain Elevator | 3/4 HP | 4400 | 1400 |
| Milk Cooler | | 2900 | 1100 |
| Milker (Vacuum Pump) | 2 HP | 10500 | 2800 |
| FARM DUTY MOTORS | 1/3 HP | 1720 | 720 |
| Std. (e.g. Conveyors, | 1/2 HP | 2575 | 975 |
| Feed Augers, Air | 3/4 HP | 4500 | 1400 |
| Compressors) | 1 HP | 6100 | 1600 |
| | 1-1/2 HP | 8200 | 2200 |
| | 2 HP | 10550 | 2850 |
| | 3 HP | 15900 | 3900 |
| | 5 HP | 23300 | 6800 |
| High Torque (e.g. Barn | 1-1/2 HP | 8100 | 2000 |
| Cleaners, Silo Unloaders, | 5 HP | 23300 | 6000 |
| Silo Hoists, Bunk Feeders) | 7-1/2 HP | 35000 | 8000 |
| | 10 HP | 46700 | 10700 |
| 3-1/2 cu. ft. Mixer | 1/2 HP | 3300 | 1000 |
| High Pressure 1.8 Gal/Min | 500 PSI | 3150 | 950 |
| Washer 2 gal/min | 550 PSI | 4500 | 1400 |
| 2 gal/min | 700 PSI | 6100 | 1600 |
| Refrigerator or Freezer | | 3100 | 800 |
| Shallow Well Pump | 1/3 HP | 2150 | 750 |
| | 1/2 HP | 3100 | 1000 |
| Sump Pump | 1/3 HP | 2100 | 800 |
| | 1/2 HP | 3200 | 1050 |

## 11-7. Approximate Power Requirements For Contractor Equipment

| Contractor | Rating | Starting Watts | Running Watts |
|---|---|---|---|
| Hand Drill | 1/4 in | 350 | 350 |
| | 3/8 in | 400 | 400 |
| | 1/2 in | 600 | 600 |
| Circular Saw | 6-1/2 in | 500 | 500 |
| | 7-1/4 in | 900 | 900 |
| | 8-1/4 in | 1400 | 1400 |
| Table Saw | 9 in | 4500 | 1500 |
| | 10 in | 6300 | 1800 |
| Band Saw | 14 in | 2500 | 1100 |
| Bench Grinder | 6 in | 1720 | 720 |
| | 8 in | 3900 | 1400 |
| | 10 in | 5200 | 1600 |
| Air Compressor | 1/2 HP | 3000 | 1000 |
| | 1 HP | 6000 | 1500 |
| | 1-1/2 HP | 8200 | 2200 |
| | 2 HP | 10500 | 2800 |
| Electric Chain Saw | 1-1/2 HP, 12 in | 1100 | 1100 |
| | 2 HP, 14 in | 1100 | 1100 |
| Electric Trimmer | Standard 9 in | 350 | 350 |
| | Heavy Duty 12 in | 500 | 500 |
| Electric Cultivator | 1/3 HP | 2100 | 700 |
| Elec. Hedge Trimmer | 18 in | 400 | 400 |
| Flood Lights | HID | 125 | 100 |
| | Metal Halide | 313 | 250 |
| | Mercury | 1000 | |
| | Sodium | 1400 | |
| | Vapor | 1250 | 1000 |
| Submersible Pump | 400 gph | 600 | 200 |
| Centrifugal Pump | 900 gph | 900 | 500 |
| Floor Polisher | 3/4 HP, 16 in | 4500 | 1400 |
| | 1 HP, 20 in | 6100 | 1600 |
| High Pressure Washer | 1/2 HP | 3150 | 950 |
| | 3/4 HP | 4500 | 1400 |
| | 1 HP | 6100 | 1600 |
| 55 gal Drum Mixer | 1/4 HP | 1900 | 700 |
| Wet & Dry Vac | 1.7 HP | 900 | 900 |
| | 2-1/2 HP | 1300 | 1300 |

## 11-8. Power Required To Start Motor




1 Motor Start Code
2 Running Amperage
3 Motor HP
4 Motor Voltage

To find starting amperage:

**Step 1:** Find code and use table to find kVA/HP. If code is not listed, multiply running amperage by six to find starting amperage.

**Step 2**: Find Motor HP and Volts.

**Step 3:** Determine starting amperage (see example).

Welding generator amperage output must be at least twice the motor's running amperage.

**Single-Phase Induction Motor Starting Requirements**

| Motor Start Code | G | H | J | K | L | M | N | P |
|---|---|---|---|---|---|---|---|---|
| KVA/HP | 6.3 | 7.1 | 8.0 | 9.0 | 10.0 | 11.2 | 12.5 | 14.0 |

$$\frac{\textbf{kVA/HP x HP x 1000}}{\textbf{VOLTS}} = \textbf{STARTING AMPERAGE}$$

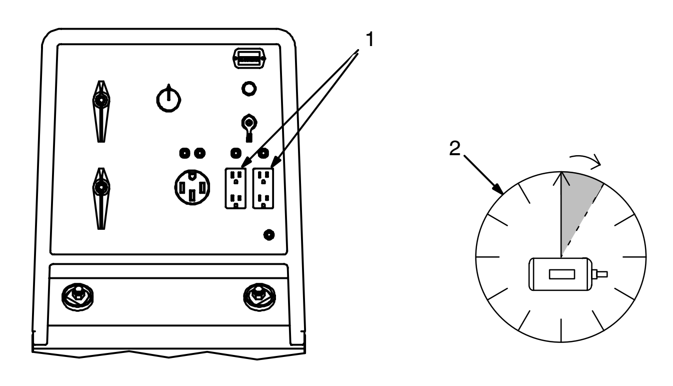
**EXAMPLE:** Calculate the starting amperage required for a 230 V, 1/4 HP motor with a motor start code of M.

Volts = 230 HP = 1/4 Using Table, Code M results in kVA/HP = 11.2

$$\frac{11.2 \times 1/4 \times 1000}{230} = 12.2\ \text{A}$$ **Starting the motor requires 12.2 amperes.**

S-0624

## 11-9. How Much Power Can Generator Supply?




1 Limit Load To 90% Of Generator Output

Always start non-resistive (motor) loads in order from largest to smallest, and add resistive loads last.

2 5 Second Rule

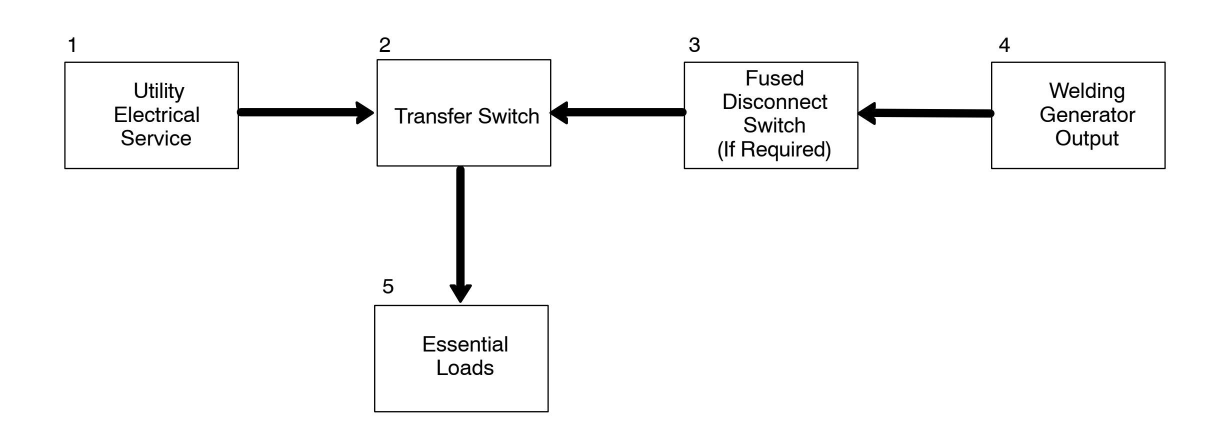
If motor does not start within 5 seconds, turn off power to prevent motor damage. Motor requires more power than generator can supply.

Ref. ST-800 396-A / S-0625

## 11-10. Typical Connections To Supply Standby Power




▲ **Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.**




▲ **Have only qualified persons perform these connections according to all applicable codes and safety practices.**

▲ **Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.**

☞ *Customer-supplied equipment is required if generator will supply standby power during emergencies or power outages.*

1 Utility Electrical Service

2 Transfer Switch (Double-Throw)

Switch transfers the electrical load from electric utility service to the generator. Transfer load back to electric utility when service is restored.

Install correct switch (customer-supplied). Switch rating must be same as or greater than the branch overcurrent protection.

3 Fused Disconnect Switch

Install correct switch (customer-supplied) if required by electrical code.

4 Welding Generator Output

Generator output voltage and wiring must be consistent with regular (utility) system voltage and wiring.

Connect generator with temporary or permanent wiring suitable for the installation.

Turn off or unplug all equipment connected to generator before starting or stopping engine. When starting or stopping, the engine has low speed which causes low voltage and frequency.

5 Essential Loads

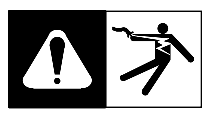
Generator output may not meet the electrical requirements of the premises. If generator does not produce enough output to meet all requirements, connect only essential loads (pumps, freezers, heaters, etc. – See Section 11-4).

# Notes

**Work like a Pro!**

**Pros weld and cut safely. Read the safety rules at the beginning of this manual.**

## 11-11. Selecting Extension Cord (Use Shortest Cord Possible)



**Cord Lengths for 120 Volt Loads**

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

| Current (Amperes) | Load (Watts) | Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)* | | | | | |
|---|---|---|---|---|---|---|---|
| | | 4 | 6 | 8 | 10 | 12 | 14 |
| 5 | 600 | | | 350 (106) | 225 (68) | 137 (42) | 100 (30) |
| 7 | 840 | | 400 (122) | 250 (76) | 150 (46) | 100 (30) | 62 (19) |
| 10 | 1200 | 400 (122) | 275 (84) | 175 (53) | 112 (34) | 62 (19) | 50 (15) |
| 15 | 1800 | 300 (91) | 175 (53) | 112 (34) | 75 (23) | 37 (11) | 30 (9) |
| 20 | 2400 | 225 (68) | 137 (42) | 87 (26) | 50 (15) | 30 (9) | |
| 25 | 3000 | 175 (53) | 112 (34) | 62 (19) | 37 (11) | | |
| 30 | 3600 | 150 (46) | 87 (26) | 50 (15) | 37 (11) | | |
| 35 | 4200 | 125 (38) | 75 (23) | 50 (15) | | | |
| 40 | 4800 | 112 (34) | 62 (19) | 37 (11) | | | |
| 45 | 5400 | 100 (30) | 62 (19) | | | | |
| 50 | 6000 | 87 (26) | 50 (15) | | | | |

*Conductor size is based on maximum 2% voltage drop

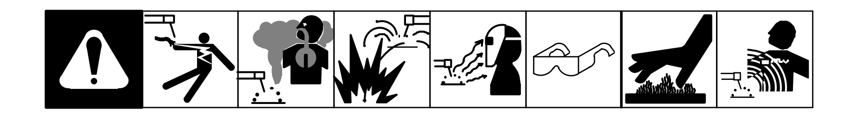
**Cord Lengths for 240 Volt Loads**

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

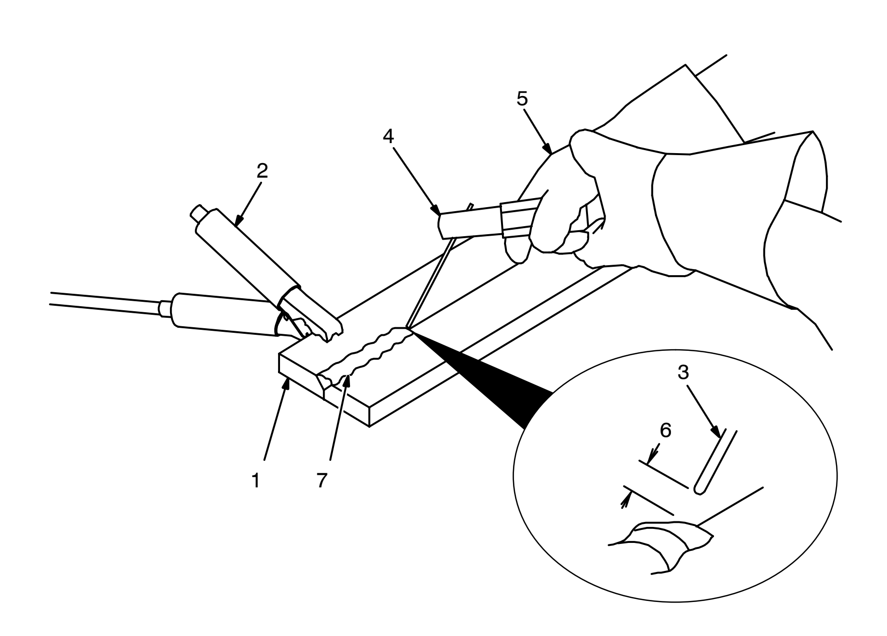
| Current (Amperes) | Load (Watts) | Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)* | | | | | |
|---|---|---|---|---|---|---|---|
| | | 4 | 6 | 8 | 10 | 12 | 14 |
| 5 | 1200 | | | 700 (213) | 450 (137) | 225 (84) | 200 (61) |
| 7 | 1680 | | 800 (244) | 500 (152) | 300 (91) | 200 (61) | 125 (38) |
| 10 | 2400 | 800 (244) | 550 (168) | 350 (107) | 225 (69) | 125 (38) | 100 (31) |
| 15 | 3600 | 600 (183) | 350 (107) | 225 (69) | 150 (46) | 75 (23) | 60 (18) |
| 20 | 4800 | 450 (137) | 275 (84) | 175 (53) | 100 (31) | 60 (18) | |
| 25 | 6000 | 350 (107) | 225 (69) | 125 (38) | 75 (23) | | |
| 30 | 7000 | 300 (91) | 175 (53) | 100 (31) | 75 (23) | | |
| 35 | 8400 | 250 (76) | 150 (46) | 100 (31) | | | |
| 40 | 9600 | 225 (69) | 125 (38) | 75 (23) | | | |
| 45 | 10,800 | 200 (61) | 125 (38) | | | | |
| 50 | 12,000 | 175 (53) | 100 (31) | | | | |

*Conductor size is based on maximum 2% voltage drop

# SECTION 12 – STICK WELDING (SMAW) GUIDELINES



## 12-1. Stick Welding Procedure




▲ **Weld current starts when electrode touches workpiece.**

▲ **Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.**

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

3 Electrode

A small diameter electrode requires less current than a large one. Follow electrode manufacturer's instructions when setting weld amperage (see Section 12-2).

4 Insulated Electrode Holder

5 Electrode Holder Position

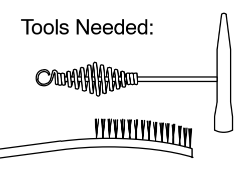
6 Arc Length

Arc length is the distance from the electrode to the workpiece. A short arc with correct amperage will give a sharp, crackling sound.

7 Slag

Use a chipping hammer and wire brush to remove slag. Remove slag and check weld bead before making another weld pass.

Tools Needed:



stick 12/96 – ST-151 593

## 12-2. Electrode and Amperage Selection Chart

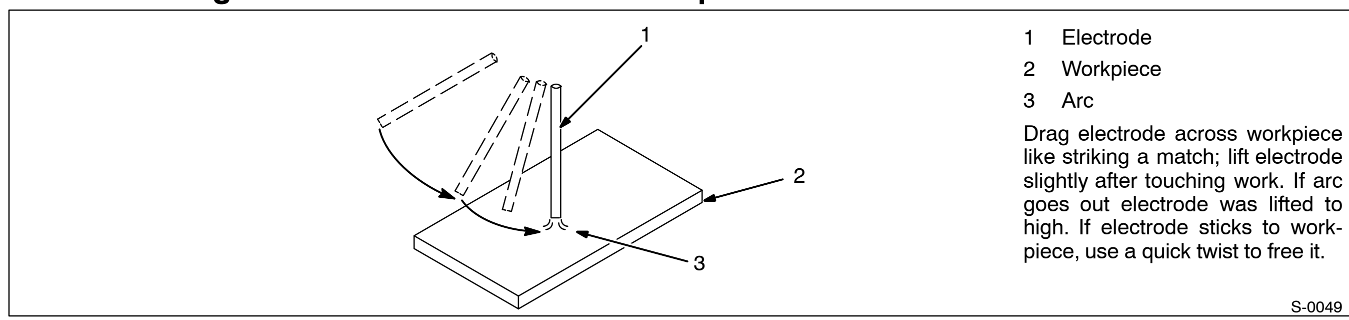
| ELECTRODE | DIAMETER | AMPERAGE RANGE (50 – 100 – 150 – 200 – 250 – 300 – 350 – 400 – 450) |
|---|---|---|
| 6010 & 6011 | 3/32 | |
| | 1/8 | |
| | 5/32 | |
| | 3/16 | |
| | 7/32 | |
| | 1/4 | |
| 6013 | 1/16 | |
| | 5/64 | |
| | 3/32 | |
| | 1/8 | |
| | 5/32 | |
| | 3/16 | |
| | 7/32 | |
| | 1/4 | |
| 7014 | 3/32 | |
| | 1/8 | |
| | 5/32 | |
| | 3/16 | |
| | 7/32 | |
| | 1/4 | |
| 7018 | 3/32 | |
| | 1/8 | |
| | 5/32 | |
| | 3/16 | |
| | 7/32 | |
| | 1/4 | |
| 7024 | 3/32 | |
| | 1/8 | |
| | 5/32 | |
| | 3/16 | |
| | 7/32 | |
| | 1/4 | |
| Ni-Cl | 3/32 | |
| | 1/8 | |
| | 5/32 | |
| | 3/16 | |
| 308L | 3/32 | |
| | 1/8 | |
| | 5/32 | |

| ELECTRODE | DC* | AC | POSITION | PENETRATION | USAGE |
|---|---|---|---|---|---|
| 6010 | EP | | ALL | DEEP | MIN. PREP, ROUGH HIGH SPATTER |
| 6011 | EP | ✓ | ALL | DEEP | |
| 6013 | EP,EN | ✓ | ALL | LOW | GENERAL |
| 7014 | EP,EN | ✓ | ALL | MED | SMOOTH, EASY, FAST |
| 7018 | EP | ✓ | ALL | LOW | LOW HYDROGEN, STRONG |
| 7024 | EP,EN | ✓ | FLAT HORIZ FILLET | LOW | SMOOTH, EASY, FASTER |
| NI-CL | EP | ✓ | ALL | LOW | CAST IRON |
| 308L | EP | ✓ | ALL | LOW | STAINLESS |

*EP = ELECTRODE POSITIVE (REVERSE POLARITY)
EN = ELECTRODE NEGATIVE (STRAIGHT POLARITY)

Ref. S-087 985-A

## 12-3. Striking an Arc – Scratch Start Technique

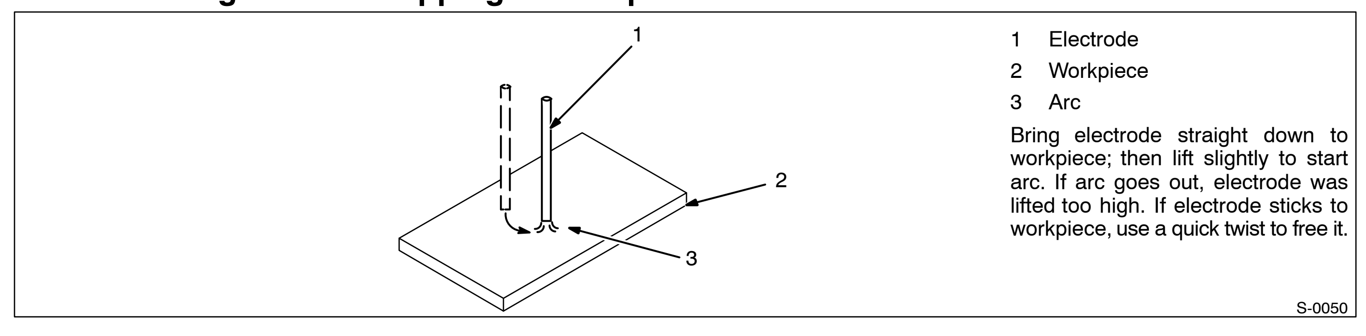



1 Electrode
2 Workpiece
3 Arc

Drag electrode across workpiece like striking a match; lift electrode slightly after touching work. If arc goes out electrode was lifted to high. If electrode sticks to workpiece, use a quick twist to free it.

S-0049

## 12-4. Striking an Arc – Tapping Technique

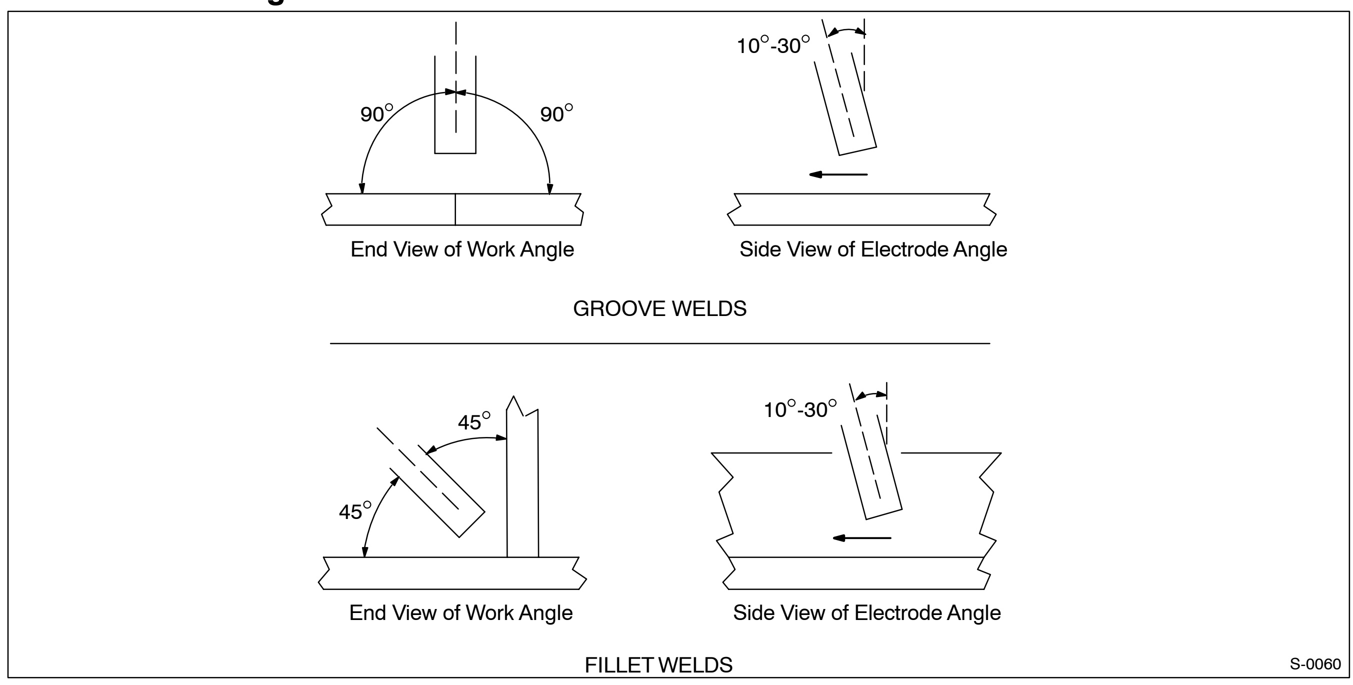



1 Electrode
2 Workpiece
3 Arc

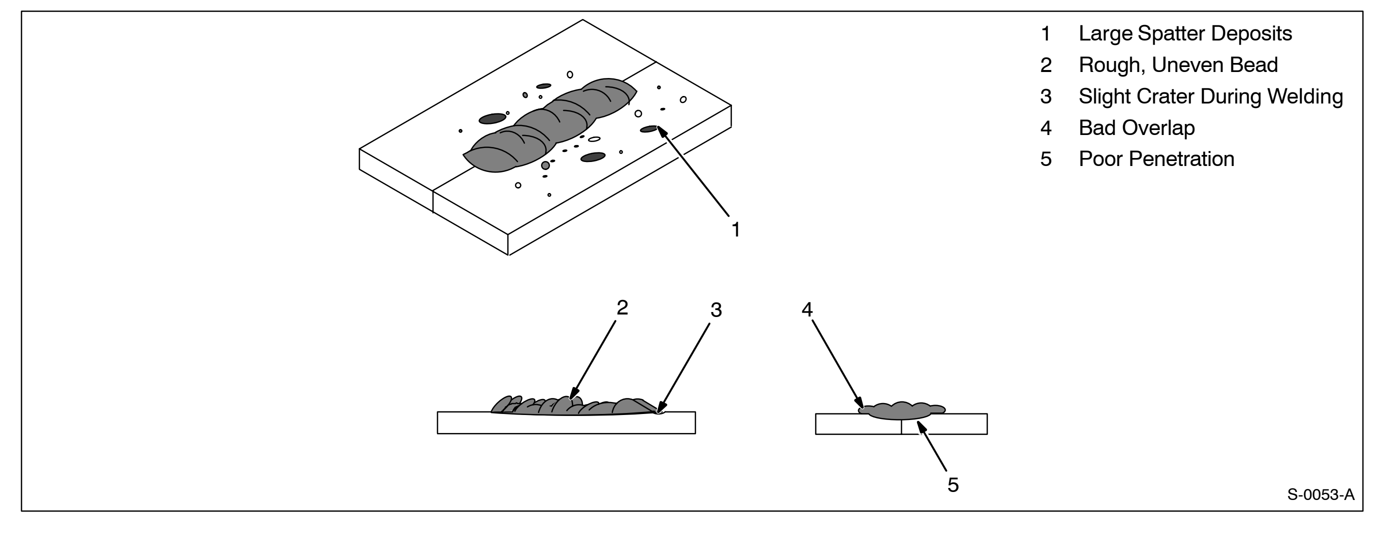
Bring electrode straight down to workpiece; then lift slightly to start arc. If arc goes out, electrode was lifted too high. If electrode sticks to workpiece, use a quick twist to free it.

S-0050

## 12-5. Positioning Electrode Holder

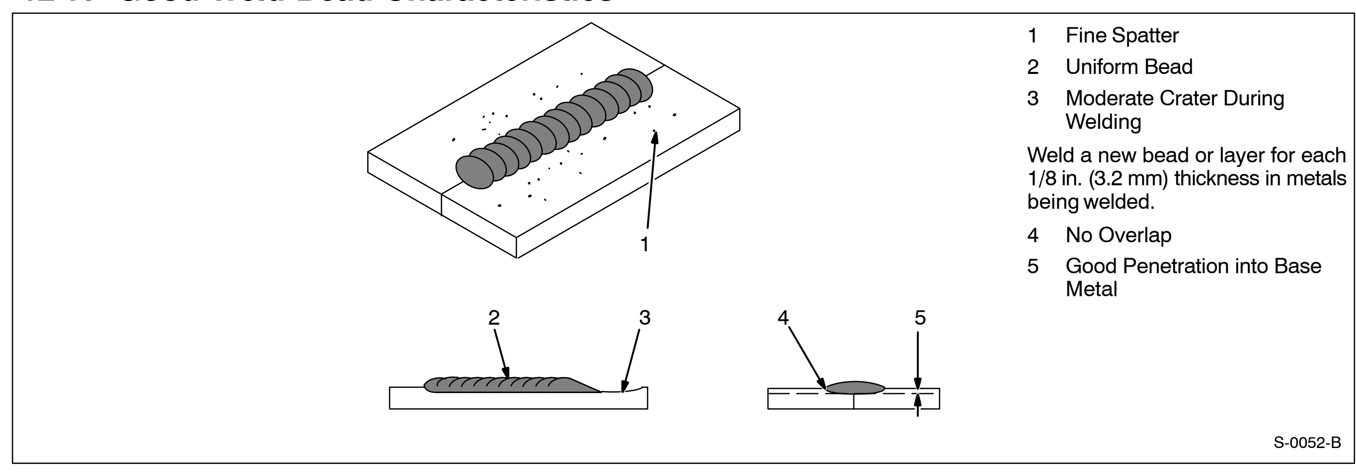



## 12-6. Poor Weld Bead Characteristics




1 Large Spatter Deposits
2 Rough, Uneven Bead
3 Slight Crater During Welding
4 Bad Overlap
5 Poor Penetration

## 12-7. Good Weld Bead Characteristics




1 Fine Spatter
2 Uniform Bead
3 Moderate Crater During Welding

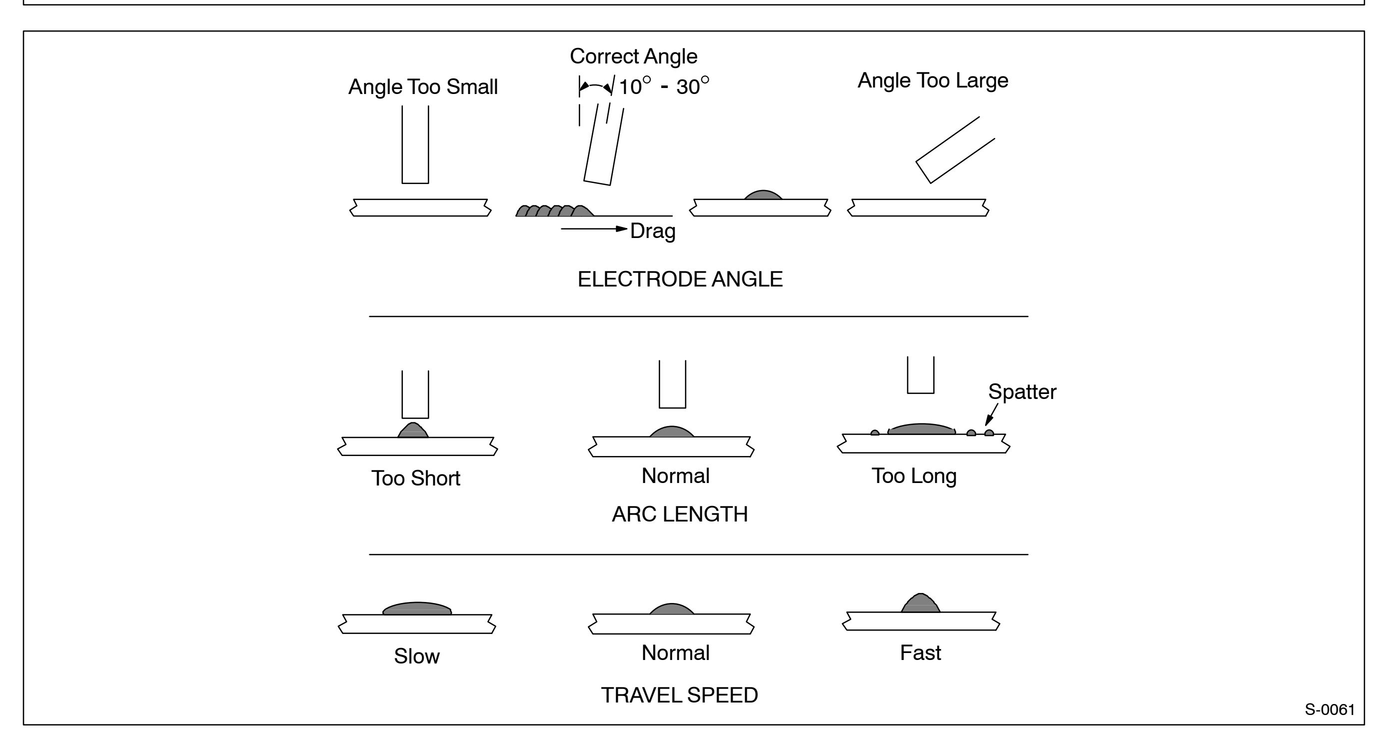
Weld a new bead or layer for each 1/8 in. (3.2 mm) thickness in metals being welded.

4 No Overlap
5 Good Penetration into Base Metal

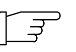
## 12-8. Conditions That Affect Weld Bead Shape

**NOTE**

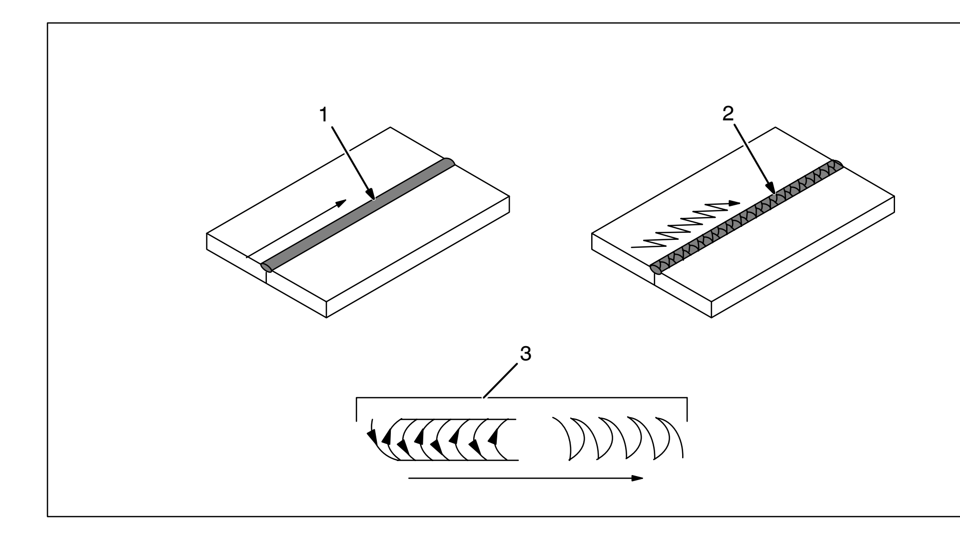
*Weld bead shape is affected by electrode angle, arc length, travel speed, and thickness of base metal.*




## 12-9. Electrode Movement During Welding

**NOTE** 

*Normally, a single stringer bead is satisfactory for most narrow groove weld joints; however, for wide groove weld joints or bridging across gaps, a weave bead or multiple stringer beads work better.*




1 Stringer Bead − Steady Movement Along Seam

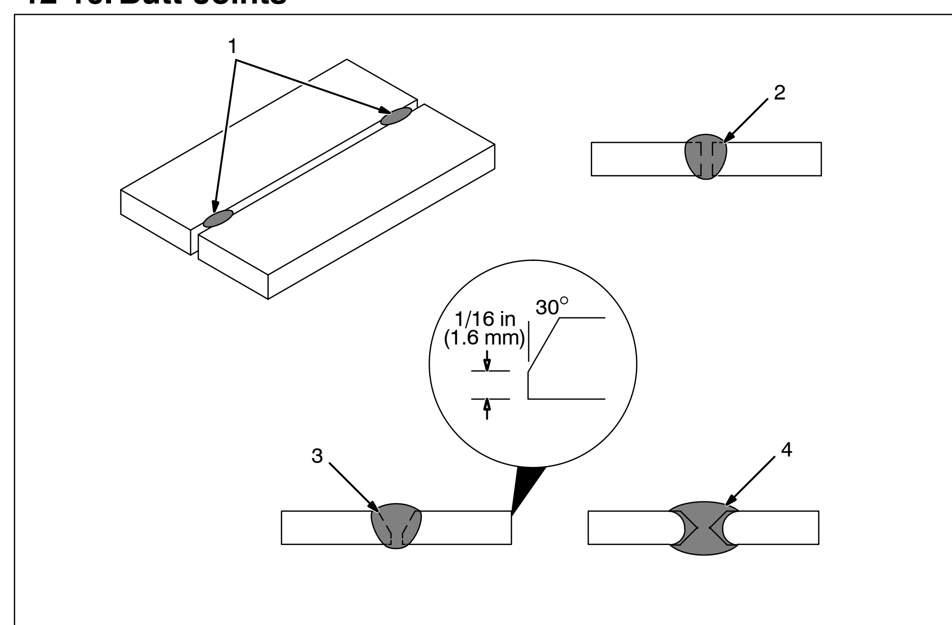
2 Weave Bead − Side to Side Movement Along Seam

3 Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode. Do not let weave width exceed 2-1/2 times diameter of electrode.

S-0054-A

## 12-10. Butt Joints




1 Tack Welds

Prevent edges of joint from drawing together ahead of electrode by tack welding the materials in position before final weld.

2 Square Groove Weld

Good for materials up to 3/16 in (5 mm) thick.

3 Single V-Groove Weld

Good for materials 3/16 – 3/4 in (5-19 mm) thick. Cut bevel with oxy-acetylene or plasma cutting equipment. Remove scale from material after cutting. A grinder can also be used to prepare bevels.

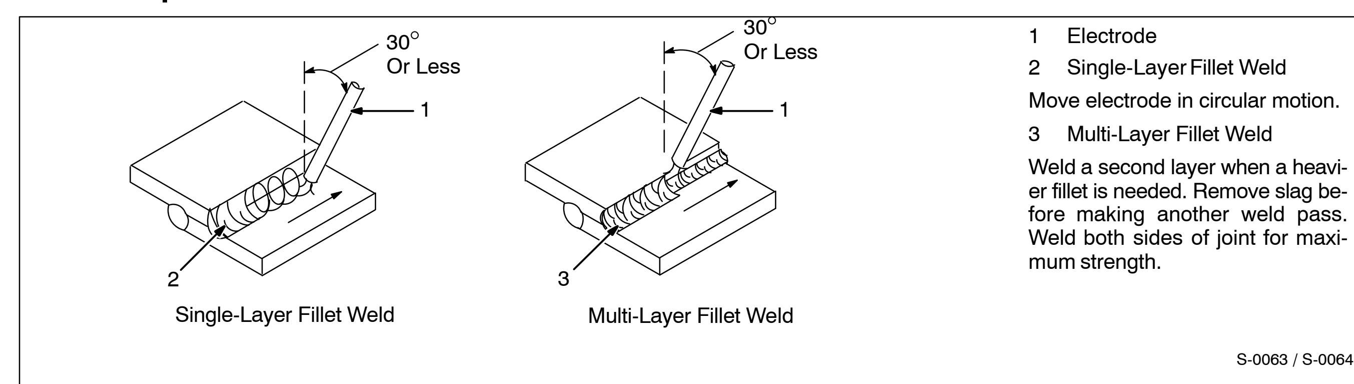
Create 30 degree angle of bevel on materials in V-groove welding.

4 Double V-Groove Weld

Good for materials thicker than 3/16 in (5 mm).

S-0662

## 12-11. Lap Joint




1 Electrode

2 Single-Layer Fillet Weld

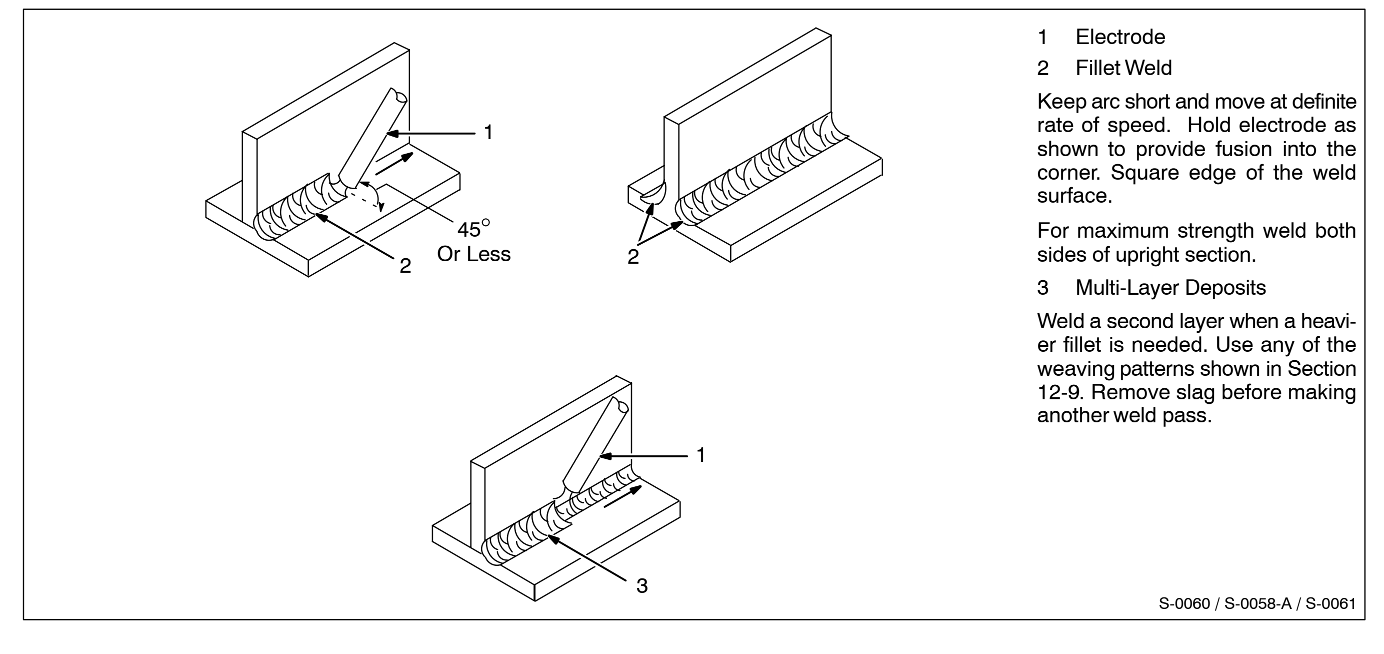
Move electrode in circular motion.

3 Multi-Layer Fillet Weld

Weld a second layer when a heavier fillet is needed. Remove slag before making another weld pass. Weld both sides of joint for maximum strength.

S-0063 / S-0064

## 12-12. Tee Joint




1 Electrode

2 Fillet Weld

Keep arc short and move at definite rate of speed. Hold electrode as shown to provide fusion into the corner. Square edge of the weld surface.

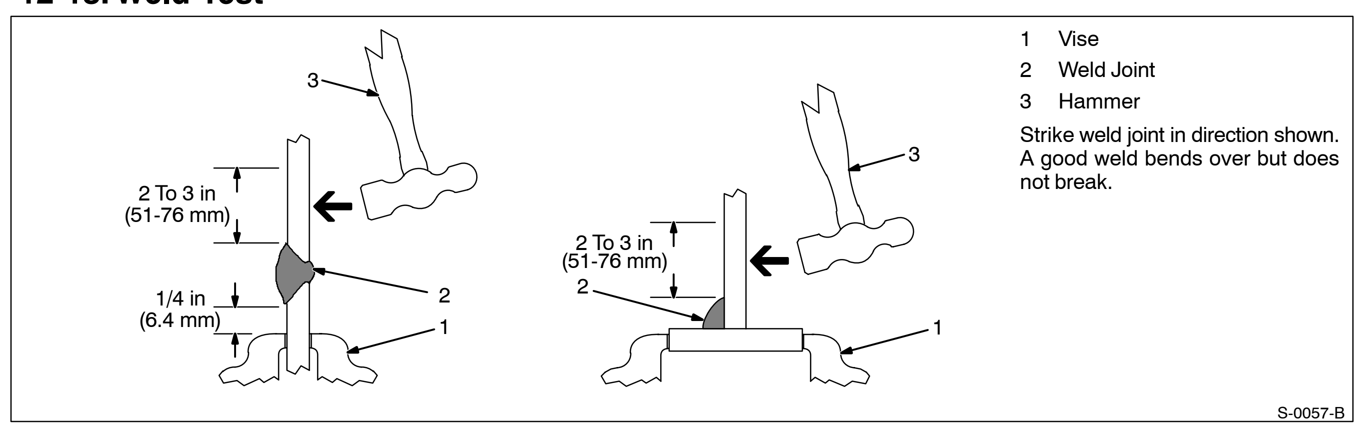
For maximum strength weld both sides of upright section.

3 Multi-Layer Deposits

Weld a second layer when a heavier fillet is needed. Use any of the weaving patterns shown in Section 12-9. Remove slag before making another weld pass.

S-0060 / S-0058-A / S-0061

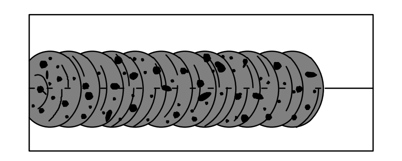
## 12-13. Weld Test




1 Vise
2 Weld Joint
3 Hammer

Strike weld joint in direction shown. A good weld bends over but does not break.

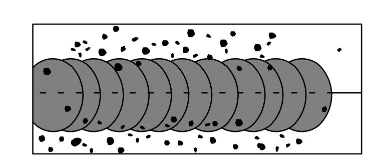
## 12-14. Troubleshooting – Porosity



Porosity – small cavities or holes resulting from gas pockets in weld metal.

| Possible Causes | Corrective Actions |
|---|---|
| Arc length too long. | Reduce arc length. |
| Damp electrode. | Use dry electrode. |
| Workpiece dirty. | Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding. |

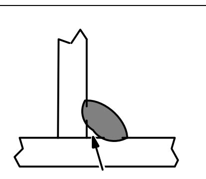
## 12-15. Troubleshooting – Excessive Spatter

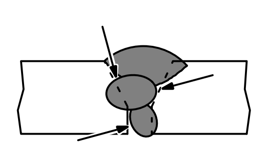


Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.

| Possible Causes | Corrective Actions |
|---|---|
| Amperage too high for electrode. | Decrease amperage or select larger electrode. |
| Arc length too long or voltage too high. | Reduce arc length or voltage. |

## 12-16. Troubleshooting – Incomplete Fusion

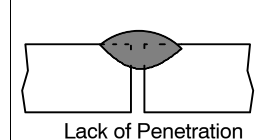




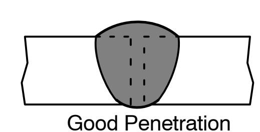
Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceeding weld bead.

| Possible Causes | Corrective Actions |
|---|---|
| Insufficient heat input. | Increase amperage. Select larger electrode and increase amperage. |
| Improper welding technique. | Place stringer bead in proper location(s) at joint during welding. |
| | Adjust work angle or widen groove to access bottom during welding. |
| | Momentarily hold arc on groove side walls when using weaving technique. |
| | Keep arc on leading edge of weld puddle. |
| Workpiece dirty. | Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding. |

## 12-17. Troubleshooting – Lack Of Penetration



Lack of Penetration

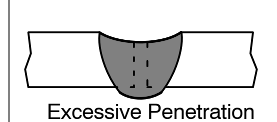


Good Penetration

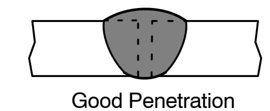
Lack Of Penetration – shallow fusion between weld metal and base metal.

| Possible Causes | Corrective Actions |
|---|---|
| Improper joint preparation. | Material too thick. Joint preparation and design must provide access to bottom of groove. |
| Improper weld technique. | Keep arc on leading edge of weld puddle. |
| Insufficient heat input. | Increase amperage. Select larger electrode and increase amperage. |
| | Reduce travel speed. |

## 12-18. Troubleshooting – Excessive Penetration



Excessive Penetration

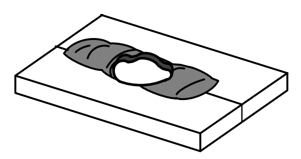


Good Penetration

Excessive Penetration – weld metal melting through base metal and hanging underneath weld.

| Possible Causes | Corrective Actions |
|---|---|
| Excessive heat input. | Select lower amperage. Use smaller electrode. |
| | Increase and/or maintain steady travel speed. |

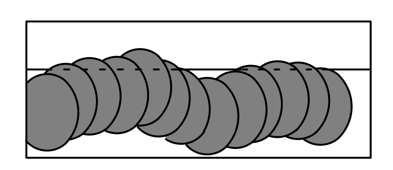
## 12-19. Troubleshooting – Burn-Through



Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.

| Possible Causes | Corrective Actions |
|---|---|
| Excessive heat input. | Select lower amperage. Use smaller electrode. |
| | Increase and/or maintain steady travel speed. |

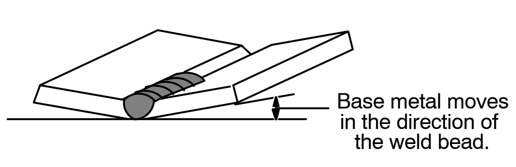
## 12-20. Troubleshooting – Waviness Of Bead



Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.

| Possible Causes | Corrective Actions |
|---|---|
| Unsteady hand. | Use two hands. Practice technique. |

## 12-21. Troubleshooting – Distortion




Distortion – contraction of weld metal during welding that forces base metal to move.

| Possible Causes | Corrective Actions |
|---|---|
| Excessive heat input. | Use restraint (clamp) to hold base metal in position. |
| | Make tack welds along joint before starting welding operation. |
| | Select lower amperage for electrode. |
| | Increase travel speed. |
| | Weld in small segments and allow cooling between welds. |

# Notes

**MATERIAL THICKNESS REFERENCE CHART**

24 Gauge (.025 in)
22 Gauge (.031 in)
20 Gauge (.037 in)
18 Gauge (.050 in)
16 Gauge (.063 in)
14 Gauge (.078 in)
1/8 in (.125 in)
3/16 in (.188 in)
1/4 in (.25 in)
5/16 in (.313 in)
3/8 in (.375 in)
1/2 in (.5 in)

# SECTION 13 – PARTS LIST

☞ *Hardware is common and not available unless listed.*

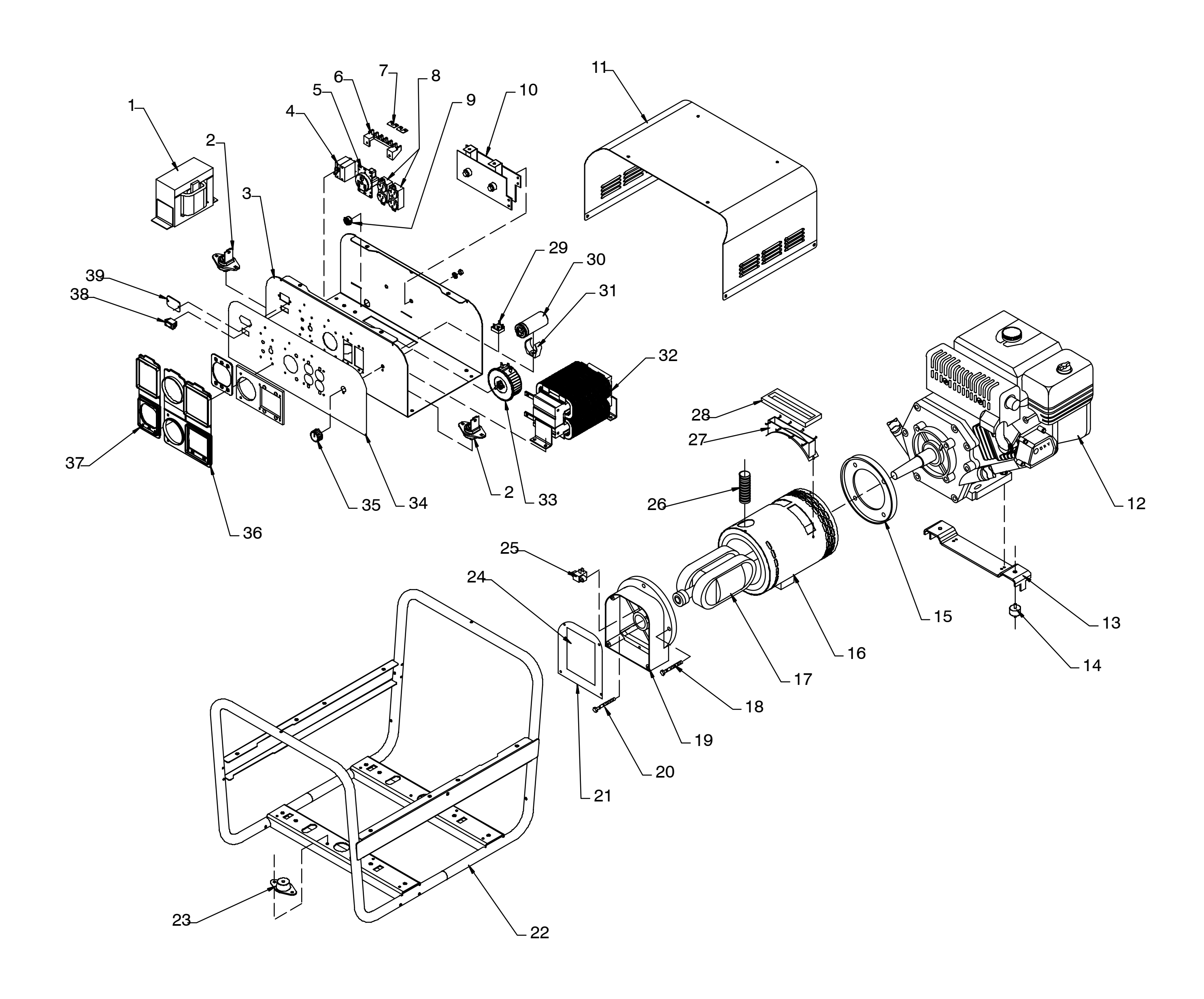



**Figure 13-1. Main Assembly Standard Model**

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|

**Figure 13-1. Main Assembly (Standard Model)**

| | | | | |
|---|---|---|---|---|
| 1 | AC−Z | 218767 | Reactor | 1 |
| 2 | | 099255 | Terminal, Pwr Output Neutral | 2 |
| 3 | | 217125 | Base, Control Box | 1 |
| 4 | CB1 | 218782 | Circuit Breaker, Man Reset 2p 20a 250vac Frict | 1 |
| 5 | RC1 | 218772 | Rcpt, Str 2p3w 50a 250v *6−50r Flush Mt | 1 |
| 6 | 1T | 172661 | Block, Stud Connection 6 Position | 1 |
| 7 | | 173734 | Link, Jumper | 2 |
| 8 | RC2, RC3 | 141432 | Rcpt, Str Dx Grd 2p3w 20a 125v *5−20r | 2 |
| 8 | GFCI2, GFCI3♦ | 151981 | Rcpt, Str Dx Grd 2p3w 15/20a 125v *5−20r Gfi | 2 |
| 9 | | 154408 | Bushing, Snap−in Nyl .562 Id X .875 Mtg Hole Cent | 1 |
| 10 | SR1 | 209715 | Rectifier, Assembly | 1 |
| 11 | | 219035 | Cover, Top | 1 |
| 12 | | 218710 | Engine, Gas Recoil Start | 1 |
| 13 | | 214724 | Bracket, Mtg Engine | 1 |
| 14 | | 211459 | Mount, Engine Vibration | 2 |
| 15 | | 494606 | Adapter, Engine | 1 |
| 16 | | 209899 | Stator, Generator | 1 |
| 17 | | 210572 | Rotor, Generator | 1 |
| 18 | | 495349 | Screw, 250−20 X 12.50 Hwd Gr5 Pld | 4 |
| 19 | | 494587 | Endbell, Gen | 1 |
| 20 | | 495348 | Screw, 312−24 X 9.25 Hwd Gr5 Pld | 1 |
| 21 | | 494628 | Panel, End Generator | 1 |
| 22 | | 216195 | Frame, Base | 1 |
| 23 | | 214727 | Mount, Generator Flange Mtg | 1 |
| 24 | | 211297 | Label, Warning General Precautionary | 1 |
| 25 | | 493509 | Brushholder Assy, Generator | 1 |
| 26 | | 210325 | Tubing, Corrugated Plastic 1.500 Dia X 3.000 | 1 |
| 27 | | 209339 | Duct, Air | 1 |
| 28 | | 209340 | Seal, Air Duct | 1 |
| 29 | SR2 | 035704 | Rectifier, Integ Bridge 40. Amp 800v | 1 |
| 30 | C1 | 218680 | Capacitor, Elctlt 2000 Uf 200 Vdc Can 1.42 Dia | 1 |
| 31 | | 494915 | Clamp, Capacitor | 1 |
| 32 | DC−Z | 218700 | Stabilizer | 1 |
| 33 | R1 | 218565 | Rheostat, Ww 150. W 50. Ohm Frict Term | 1 |
| 34 | | | Label, Nameplate (Order By Model And Serial Number) | 1 |
| 35 | | 207077 | Knob, Pointer 1.625 Dia. Push On | 1 |
| 36 | | 221758 | Cover, Receptacle W/Gasket | 1 |
| 37 | | 209056 | Cover, Receptacle W/Gasket | 1 |
| 38 | | 221273 | Blank,Snap−in Nyl .500 X 1.100 Mtg Hole Black | 1 |
| 39 | | 495386 | Cover, Meter Hole | 1 |

♦ Optional

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**

*☞ Hardware is common and not available unless listed.*

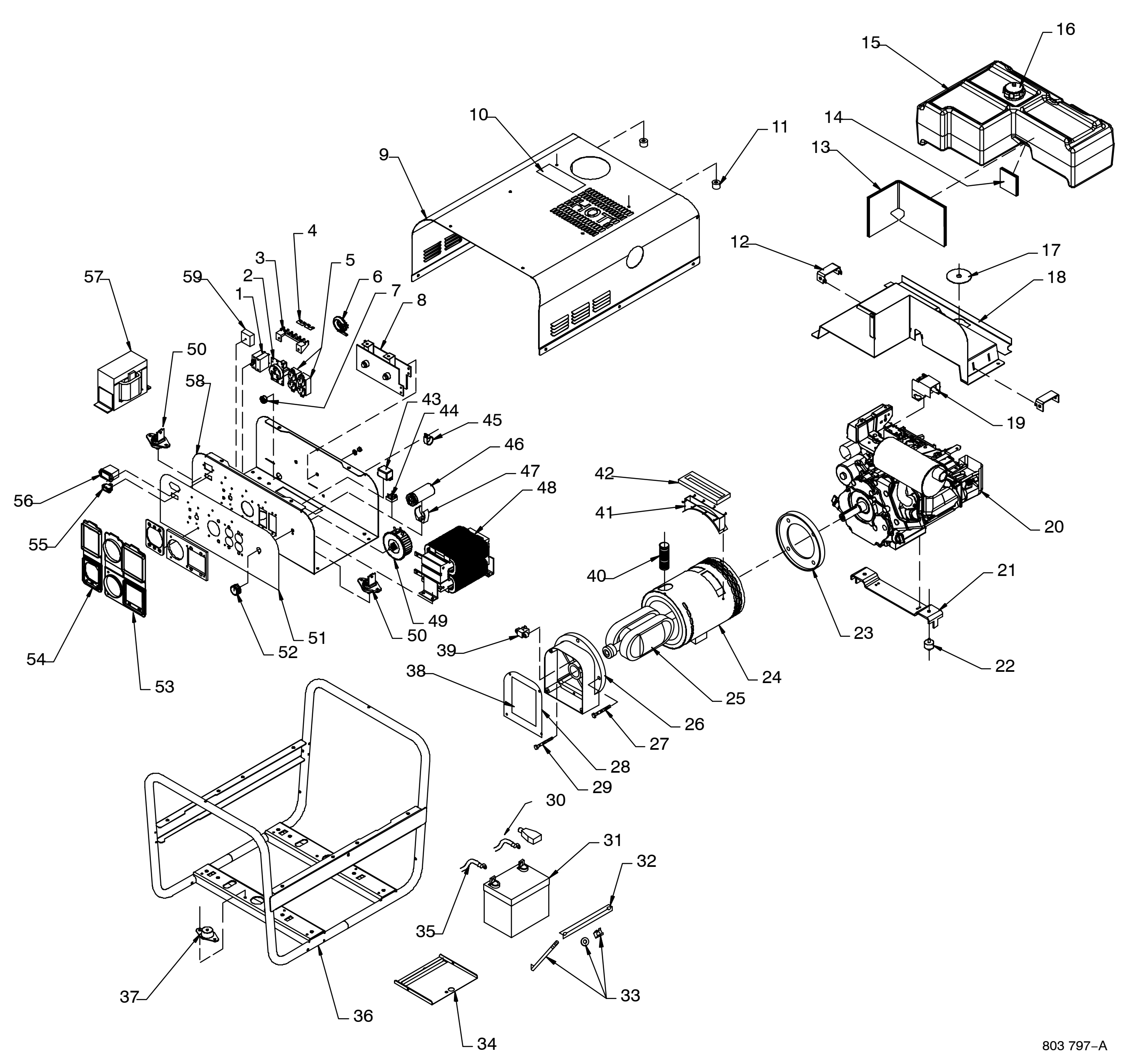



**Figure 13-2. Main Assembly DX Model**

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|
| | | | **Figure 13-2. Main Assembly (DX Model)** | |
| 1 | CB1 | 218782 | Circuit Breaker, Man Reset 2p 20a 250vac Frict | 1 |
| 2 | RC1 | 218772 | Rcpt, Str 2p3w 50a 250v *6−50r Flush Mt | 1 |
| 3 | 1T | 172661 | Block, Stud Connection 6 Position | 1 |
| 4 | | 173734 | Link, Jumper | 2 |
| 5 | RC2, RC3 | 141432 | Rcpt, Str Dx Grd 2p3w 20a 125v *5−20r | 2 |
| 5 | GFCI2, GFCI3♦ | 151981 | Rcpt, Str Dx Grd 2p3w 15/20a 125v *5−20r Gfi | 2 |
| 6 | CT1 | 219510 | Xfmr, Current Sensing | 1 |
| 7 | | 154408 | Bushing, Snap−in Nyl .562 Id X .875 Mtg Hole Cent | 1 |
| 8 | SR1 | 209715 | Rectifier, Assembly | 1 |
| 9 | | 209014 | Cover, Top | 1 |
| 10 | | 219329 | Label, Use Gasoline Fuel Only | 1 |

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|

**Figure 13-2. Main Assembly (Continued)**

| | | | | |
|---|---|---|---|---|
| 11 | | 087341 | Bumper,Door 1.000 Od X .750 High Rbr 50 Duro W/O | 2 |
| 12 | | 221007 | Bracket,Support Fuel Tank | 2 |
| 13 | | 221038 | Insulation,Thermal Fuel Tank Upper | 1 |
| 14 | | 221039 | Insulation,Thermal Fuel Tank Lower | 1 |
| 15 | | 217286 | Tank, Fuel 5.0 Gal | 1 |
| 16 | | 220711 | Cap, Tank Screw−on W/Vent | 1 |
| 17 | | 221746 | Grommet, Rbr .750 Id X 4.000 Od X .062t | 1 |
| 18 | | 221750 | Shield, Heat | 1 |
| 19 | TS1 | 218794 | Solenoid, 14vdc .53 Amp Pull Type Cont (included with item 20) | 1 |
| | | 218788 | . . Bracket, Mtg Solenoid | 1 |
| | | 602306 | . . Pin, Spring Cs .125 X .500 | 1 |
| 20 | | 218785 | Engine, Gas Elec Start (includes) | 1 |
| | | 218411 | . . Muffler, Exhaust Engine | 1 |
| 21 | | 214724 | Bracket, Mtg Engine | 1 |
| 22 | | 211459 | Mount, Engine Vibration | 2 |
| 23 | | 494606 | Adapter, Engine | 1 |
| 24 | | 209899 | Stator, Generator | 1 |
| 25 | | 210572 | Rotor, Generator | 1 |
| 26 | | 494587 | Endbell, Gen | 1 |
| 27 | | 495349 | Screw, 250−20 X 12.50 Hwd Gr5 Pld | 4 |
| 28 | | 494628 | Panel, End Generator | 1 |
| 29 | | 495348 | Screw, 312−24 X 9.25 Hwd Gr5 Pld | 1 |
| 30 | | 219642 | Cable, Bat Pos 18.000 6ga W/.312 Rng & .312 Rng | 1 |
| | | 494039 | Cover, Cable Btry Post | 1 |
| 31 | | 495124 | Battery, 12v Light Utility (Dry) | 0 |
| 32 | | 493057 | Clamp, Battery | 1 |
| 33 | | 494604 | Bolt,J Stl .250−20 X 8.000 Pld W/Nuts&washers | 2 |
| 34 | | 218181 | Tray, Battery | 1 |
| 35 | | 211180 | Cable, Bat Neg 19.000 6ga W/.312 Rng & .312 Rng | 1 |
| 36 | | 216195 | Frame, Base | 1 |
| 37 | | 214727 | Mount, Generator Flange Mtg | 1 |
| 38 | | 211297 | Label, Warning General Precautionary | 1 |
| 39 | | 493509 | Brushholder Assy, Generator | 1 |
| 40 | | 210325 | Tubing, Corrugated Plastic 1.500 Dia X 3.000 | 1 |
| 41 | | 209339 | Duct, Air | 1 |
| 42 | | 209340 | Seal, Air Duct | 1 |
| 43 | CR1 | 219494 | Relay, Encl 120vac Spst 5a No/120vac 4pin Flange | 1 |
| 44 | SR2 | 035704 | Rectifier, Integ Bridge 40. Amp 800v | 1 |
| 45 | | 127854 | Clamp, Stl Cush 1.312 Dia X .343 Mtg Hole | 1 |
| 46 | C1 | 218680 | Capacitor, Elctlt 2000 Uf 200 Vdc Can 1.42 Dia | 1 |
| 47 | | 494915 | Clamp, Capacitor | 1 |
| 48 | DC−Z | 218700 | Stabilizer, | 1 |
| 49 | R1 | 218565 | Rheostat, Ww 150. W 50. Ohm Frict Term | 1 |
| 50 | | 099255 | Terminal, Pwr Output Neutral | 2 |
| 51 | | | Label, Nameplate (Order By Model And Serial Number) | 1 |
| 52 | | 207077 | Knob, Pointer 1.625 Dia. Push On | 1 |
| 53 | | 221758 | Cover, Receptacle W/Gasket | 1 |
| 54 | | 209056 | Cover, Receptacle W/Gasket | 1 |
| 55 | S1 | 111997 | Switch,Rocker Spst 10a 250vac On−off Visi Red Rock | 1 |
| 56 | HM | 176365 | Meter, Hour | 1 |
| 57 | AC−Z | 218767 | Reactor, | 1 |
| 58 | | 217125 | Base, Control Box | 1 |
| 59 | PC1 | 201936 | Module, Pull To Idle 5 Pin | 1 |

♦ Optional

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

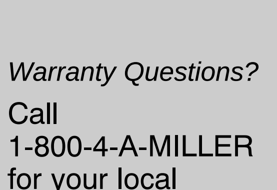
**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**




Effective January 1, 2004
(Equipment with a serial number preface of “LE” or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

*Warranty Questions?*




Your distributor also gives you ...

**Service**
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

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Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.




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Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts — 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Sources (Unless Otherwise Stated)
   * Water Coolant Systems (Integrated)
   * Intellitig
   * Maxstar 150
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources and Coolers
   * Water Coolant Systems (Non-Integrated)
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Maxstar 85, 140
   * Spot Welders
   * Load Banks
   * Arc Stud Power Sources & Arc Stud Guns
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT & SAF Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

Miller’s True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer’s warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller’s option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer’s risk and expense. Miller’s option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

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# Owner's Record

Please complete and retain with your personal records.

| | |
|---|---|
| Model Name | Serial/Style Number |
| Purchase Date | (Date which equipment was delivered to original customer.) |
| Distributor | |
| Address | |
| City | |
| State | Zip |



# For Service

***Call 1-800-4-A-Miller or see our website at www.MillerWelds.com to locate a DISTRIBUTOR or SERVICE AGENCY near you.***

Always provide Model Name and Serial/Style Number.

| | |
|---|---|
| Contact your Distributor for: | Welding Supplies and Consumables<br>Options and Accessories<br>Personal Safety Equipment<br>Service and Repair<br>Replacement Parts<br>Training (Schools, Videos, Books)<br>Technical Manuals (Servicing Information and Parts)<br>Circuit Diagrams<br>Welding Process Handbooks |
| Contact the Delivering Carrier to: | File a claim for loss or damage during shipment.<br>For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department. |


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